PRACTICAL NURSING

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PREFACE.

In the following chapters we have dealt with the nurse's work from a general point of view. In another volume we hope to consider in detail the nursing of the various medical and surgical ailments, and also devote some space to special branches of nursing.

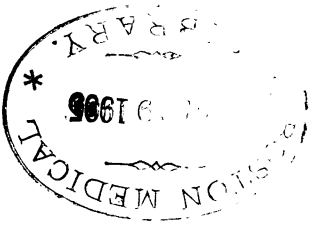
Our great aim in writing this book has been to make the practical part of it as thorough as possible, and to give every step in the performance of the various nursing operations. Not that we for one moment believe that book-work can ever take the place of, or even compete with, ward-work; but we do hold that a precise and complete account of an operation, such as a vapour bath, will aid a nurse in the giving of it, particularly if she should be doing so in private, after having had but little experience of it during her

hospital career. It seems to us that the descriptions given in books on nursing are, as a rule, too sketchy.

Further, we have endeavoured to make clear the reasons for what a nurse does when carrying out the treatment that has been ordered. This should increase her interest in the work, and lead to a more intelligent performance of it.

We have to thank Dr W. T. G. Pugh for his very careful reading and correction of the proof-sheets.

I. S.
H. C.



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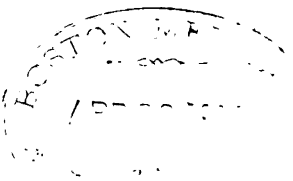

PRACTICAL NURSING.

CHAPTER I.

NURSING AS A PROFESSION.

It is only of late years that a course of systematic training has been deemed necessary for the woman who wishes to become a nurse. Even now, what that training is to consist of, its method, its length, and its minimum standard of efficiency, are matters of dispute rather than agreement. While this is so, it cannot be said that any material step has been taken towards the organisation of the nursing profession. Yet, the fact that many of the public, as well as the more thoughtful among nurses, feel the necessity for such organisation, is some small advance in the right direction.

It seems strange that the need of training was not earlier recognised by members of the medical profession; for the sufferings of patients at the hands of incompetent and often worthless women, and the

inconvenience to both physicians and surgeons, must have been very great. Without doubt there were some good nurses in the first half of this century; but the efficiency and morality of a class of women who are now chiefly represented by the Sairey Gamp and Betsy Prig of Dickens and the Mrs Horsfall of Charlotte Brontë, cannot have been very conspicuous.

In recognition of her great services during the Crimean War, the nation presented Miss Florence Nightingale with the sum of £52,000, with which she founded the Nightingale Training School for Nurses in connection with St Thomas's Hospital. It is now nearly forty years since the Home was opened, and during that time almost every hospital and infirmary in the kingdom has begun to train nurses on somewhat similar lines.

The divergence of method, which has of late years increased, was originally small. At first, twelve months of actual work in the wards was considered sufficient to qualify any woman for the responsible post of matron, assistant-matron, or ward sister. Now the time of training at the different schools varies from one to three years, the majority preferring the latter. This only qualifies for the post of sister, or for private nursing; for the higher appointments a long period of experience and supervised authority is required. When it is borne in mind that this varied period of training is given to women of every degree of intelligence and education in hospitals and infirmaries ranging from 10 to 800 beds; that in some it is methodical and careful, while in others the probationer merely learns what

she can at the expense of the patients, it will not appear strange that even now there exists a prejudice against trained nurses

Curiously enough the medical profession seems to hold over-training to be the greater evil, as tending to the production of a lower order of practitioner; whereas, it is those who have been insufficiently trained and disciplined who fail to recognise the grave responsibility of disobedience, and who take upon themselves to criticise the doctor's treatment, or even to suggest what form it should take. Such an entire misconception of the duties of a nurse does not spring from an excess of knowledge but from the reverse. It is the well-trained, carefully taught woman who recognises the limitations of her profession, and is careful never to overstep them. A minimum standard of knowledge should be laid down, and a definite length of time prescribed during which that knowledge could be obtained in hospitals large enough to ensure that it would be sufficiently varied. Finally, there should be some method of testing this knowledge by examination. Such a scheme would tend to sweep out of a grand profession the half-trained and untrained women who now peril its good name, and often bring disgrace on its ranks.

In many hospitals of the present day candidates present themselves to the matron, and she in an interview of a few minutes is supposed to discriminate, by some fine intuitive process, between the fit and unfit. This method of selection is too often found inadequate, admitting, as it does, into the wards too many incompetent candidates, who have to be discharged after a month's trial.

An increasing number of hospital authorities are beginning to feel the necessity for some little preparation in the way of special study, both practical and theoretical, leading up to an examination, by which the candidate's intelligence is tested, while at the same time her physical fitness is proved. It certainly seems desirable that probationers should begin their work in the wards with some knowledge of elementary anatomy, physiology, and hygiene, together with experience of dusting, bed-making, and other domestic work. How this is to be obtained is a difficulty that will not be easily overcome, since it entails a question of expenditure which must be borne by the candidates. The London Hospital and the Royal Infirmary at Glasgow have organised in homes connected with, but apart from, the hospitals, training-schools where candidates are taught anatomy, physiology, and hygiene from lectures by the physicians and surgeons, and practical work by the matron and her assistants. A better plan, perhaps, would be a central training home, where each hospital could choose its own probationers from among those who had attained its standard of preliminary knowledge as proved by examination. When this preliminary training becomes more general, it will lessen to a great extent the influx of unsuitable women into the wards, and will therefore materially increase the efficiency and usefulness of the nursing staff.

There is still abroad the idea that a nurse is born, not made. A woman may possess all the qualities which go to make a good nurse, but until she has developed and strengthened them by experience and discipline, and by hard work has mastered the techni-

calities and difficulties of her profession, she cannot in any sense be considered a nurse.

To become a good nurse, a woman must possess considerable intelligence, a good education, healthy physique, good manners, an even temper, a sympathetic temperament, and deft clever hands. To these she must add habits of observation, punctuality, obedience, cleanliness, a sense of proportion, and a capacity for and habit of accurate statement. Training can only strengthen these qualities and habits; it cannot produce them.

Of the necessary habits which a nurse should cultivate that of *observation* is the most important. A hospital ward is the only place where she can be taught what to see, and the value of what she sees. Her usefulness as a nurse depends so much upon the possession of this habit, and her ability to use it accurately, that she should lose no opportunity of improving it. With carefully cultivated observation comes a sense of the relative proportions of things seen and heard. *Obedience* is the first duty of a nurse and the best test of her training. It must not be the dull mechanical obedience of the ignorant or uninterested. To be effective, it must be whole-minded, intelligent, and loyal. The necessity and importance of *punctuality* and *cleanliness* should be obvious to every one. *Accuracy* implies more than the mere desire to be truthful. In social life this is not always easy; in official life the difficulty of conveying impressions, so as to place them before the mind of your listener in the light in which you yourself see them, seems at times wellnigh impossible. It requires a fairly extensive vocabulary,

a knowledge of the relative value of the facts reported on, and a certainty of observation which can only be acquired by long and intelligent attendance on the sick. Accuracy is not limited to words, but embraces the conscientious performance of duties.

The Lords' Commission on Hospitals recommended that the training of nurses should occupy a period of not less than three years. In a few of the larger hospitals such was already the case, and since then many more have made their arrangements conform with this ruling.

During her first year the new probationer should make herself well acquainted with the elements of anatomy, physiology, and hygiene, and gain a thorough knowledge of the technical part of her profession. This will include the making of beds, with or without a patient; the care and use of linen; the moving of patients; the administration of enemata; the use of the catheter, and how to clean it; the composition, value, and administration of food. She should learn, in addition, how to give medicines, with their possible results; how to pad splints, bandage, make and apply hot and cold applications and counter-irritants; how to dress wounds; the principles of aseptic surgery, the personal care of patients, and the prevention of bed-sores. These subjects, which should be taught chiefly in the wards, but also in classes by the matron or her assistant, will fully occupy the first year of training, during which the probationer should in no way be placed in a position of responsibility. At the end of this time an examination will demonstrate the extent of her knowledge, together with her fitness, or unfitness, for promotion.

The second and third years will be profitably spent in gaining experience of disease and its treatment, and in learning the relation of nursing to the work of the physician and surgeon. The nurse should now be intrusted with some little responsibility and authority, that she may learn to use both judiciously. During this time she should attend lectures by the medical staff, who will explain the causes and symptoms of the more common diseases and accidents, the object of treatment, and the proper course for her to pursue in the event of her being left in a position where she must act on her own judgment pending the arrival of medical assistance. The most diligent and intelligent of probationers will find two years all too short a time in which to learn as much as a nurse ought to know of disease and its treatment, in order that she may become a real assistant to both the physician and surgeon.

At the close of her three years' training the probationer should be able to pass an examination, which ought to be as practical as possible. It should mainly be directed to finding out whether she has gained sufficient knowledge by observation and experience, and has become deft enough in the use of her hands, to be capable of performing the duties of a nurse. The information which she has acquired from books alone should count for very little in comparison with what has been gained in the wards. Examinations, at the best, can only demonstrate that the candidate has learnt enough to enable her adequately to exercise her profession; they can never prove that this or that woman is a good nurse.

The nurse in charge of a case has a threefold duty

to perform. She has her duty to her patient, her duty to her medical officer, and her duty to herself.

(*a*) *The patient* must always be her first care; she must ever be on the alert to anticipate his wants and needs. She must be gentle but firm, striving to gain his confidence, and not fearing to use her authority when necessary. No two patients are exactly alike, therefore no actual rules can be laid down; but the nurse will not greatly err who always remembers the humanity of her patients, and makes their comfort and wellbeing her first thought.

Her manner towards her patients should be characterised by dignity and gentleness. The presence of a refined and courteous woman is sufficient under ordinary circumstances to maintain order in a ward. If reproof must be given, let it be done as quietly and briefly as possible, and not referred to again. Familiarity must always be avoided; but the nurse should show her patients, as she can in many little ways, a sympathetic willingness to help them, that her work is a pleasure, and that it is done ungrudgingly. She should be particularly gentle in her dealings with new patients, who often suffer much from nervous shyness and dread of the unknown when they first come to a hospital. This feeling is naturally increased by a hard business-like manner in the nurse who receives them, while a gentle remark or kindly inquiry will do much to remove it. A new patient should not be allowed to sit for some time unnoticed, even if all the nurses are busy: a kind word from one of them in passing will show him that he is not uncared for.

The friends of patients are often somewhat of a trial to a nurse; but she must remember that their anxiety

and their apparently needless and troublesome questions are the natural result of untried circumstances. She should make them feel that they are worthy of consideration, and that they will receive kindness and attention from her. She should endeavour to win their confidence by listening attentively to whatever they have to say, as far as it bears on the patient's condition. At the same time, she should never give them her opinion of the case, but always refer them to the sister of the ward, or the medical officer, for information.

As a private nurse she should be thorough but not fussy. She must remember that she is engaged as a help in time of distress, and should therefore be willing to perform duties in a small house which it would be quite unnecessary for her to undertake in a larger establishment. She must, in a word, suit herself to the needs of the case. She ought never to talk to one patient of the affairs or illness of another, but bear in mind that she has unusual and unavoidable opportunities of becoming acquainted with the private affairs of her patients, and that it would be a gross breach of confidence for her to make use of this knowledge. When her patient is visited by friends, she should, when possible, leave him alone with them, remaining within call, and intervening when she thinks the visit has lasted long enough.

(*b*) *To the medical attendant* a nurse's first duty is obedience. In a hospital, where the services of a resident staff are always at hand, obedience should be absolute and unquestioning. A mental habit is thus formed the power of which is never quite lost. In private practice, where more responsibility must be

left to the nurse, and where altered conditions sometimes justify a modification of the doctor's orders, her aim should be to proceed on lines likely to be approved by him rather than on those she herself might choose. Any deviation, however small, should always be at once reported to him, that he may express his opinion upon it; while a nurse should never omit to acknowledge any mistake she may have made in carrying out his instructions. She should always do her utmost to promote her patient's faith in his medical attendant. Absolute candour, loyalty, and obedience will render her a valued and trusted assistant.

(*c*) *A nurse's duty to herself* can be divided into two parts—mental and physical. If she thinks, reads, and talks about nothing but nursing, she contracts her outlook on life, lessens her intelligence, decreases her capacity for assimilating new ideas, and becomes somewhat of a nuisance to her friends. A nurse's life, passed as it is amid scenes of sorrow and suffering—often the result of what she has been taught to consider sin—is naturally depressing, and she tends to become morbid, introspective, and cramped. She will do well, therefore, to seize every legitimate means of relaxation. Her pleasures should be lightly held, tasted with enjoyment, and easily put aside; her duties grasped firmly, and unswervingly followed. Besides obtaining what pleasure and relaxation she can without detriment to her work, a nurse should keep up her interest in literature, public events, and whatever is new in her own profession. Relaxation is necessary in all professions, but in none more than in nursing, for which there are seven working days in each week, and eleven, and sometimes twelve, work-

ing hours in each day. A healthy mind is as necessary for a nurse as a healthy body, and that can only be attained by giving it a varied diet, plenty of work, and a sufficiency of play.

Nurses ought always to be most careful of their own health. If they are not so, they are less likely to be able to do their patients justice. They are very liable to suffer from sore throat and fatigue, while flat-foot and varicose veins are by no means uncommon. These ailments may to a certain extent be avoided by attention to a few simple rules of health.

Nurses should see that their bedrooms are well ventilated, the windows being open from the top, not only when they are absent, but also when they are sleeping in them. They should never go on duty fasting. They should scrupulously wash their hands and faces, and clean their nails, before taking food. The latter should be kept so short that no extraneous matter can find a resting-place beneath them; and, that they may be easily cleaned, special attention should be paid to the bases of the nails. Any wound, however slight, should be at once cleansed and protected. Careful drying will help to prevent chapped hands, and some emollient should be rubbed *into* them, *not on* them, at least twice a-day. Nurses' clothes should be light, warm, and loose. Tight stays and garters impede the circulation, leading to indigestion, varicose veins, and other discomforts.

The amount of standing which nursing necessitates, particularly when the probationer has not been accustomed to it, occasionally results in a tendency to flat-foot. With a little care this may frequently be avoided. Five or six times a-day the nurse should

raise herself on tiptoe, repeating the movement ten to twenty times. The feet should be bathed in cold water twice a-day, and when they feel tired or ache the nurse should stand for a short time on the outside of them. Pain in the arch of the foot should be attended to at once, as flat-foot is not only disfiguring, but may be so painful as to unfit a nurse for her duties.

Serious illness may often be avoided by an early attention to symptoms; a nurse should, therefore, neglect no sign, however slight, of ill-health or functional disturbance. A sore throat should always be reported at once, not only for the sake of the nurse, but also for the protection of the patients, since there is always a possibility of its being diphtheria. In almost all hospitals nurses will find directions to be observed when they are attending upon infectious cases, such as typhoid fever and diphtheria. It is their duty carefully and fully to carry out those directions.

The new probationer should, for her own sake, make herself early acquainted with the etiquette of hospital life, which is nothing more than common politeness officially expressed. She ought never to remain seated in the presence of a superior officer, nor when visitors are in the ward. She should learn to receive orders with deference and politeness. She should obey the written and unwritten laws of the hospital, respect its traditions, and so order her ways that no discredit may fall on it through want of thought on her part At the same time, there is no need for a nurse to be aggressively polite. She must remember that the sister, when present, will take the

lead in all things, and in her absence the senior nurse will act for her. A cheerfully polite manner is all that is required of a probationer, unless she is specially addressed.

The new-comer will find women of all kinds among those who are to be her companions during her term of training, and she will do well not to rush into hasty intimacies which on further acquaintance may prove undesirable. It is not wise to lay aside all reserve and be willing to be the comrade of any one. At the same time, it is foolish to adopt a churlish and repellent air, which may keep off a companionship that would prove both pleasant and profitable. The middle course is always the best. An obliging, courteous, slightly reserved manner will leave its owner free to form suitable friendships. A matron is equally suspicious of the nurse who at the end of her first year has either no friends or too many.

In the matter of study probationers will do well to act with discretion. Some nurses, after gaining a superficial knowledge of anatomy and physiology, discuss and study obscure questions, wasting their time in the pursuit of knowledge which can be of no use to them. Their reading during their term of training ought to be kept strictly within prescribed limits, covering efficiently a small portion of each subject. The following, if really known, might safely be considered sufficient: The bones of the skeleton, with their articulations; the large superficial muscles; the skin and its functions; the circulation in the large arteries and veins; the alimentary canal, and the process of digestion; a general idea of the nervous system and its functions; and the same of the kidney

and organs of special sense. If, in addition to these subjects, a nurse learns all that her work in the wards can teach her of surgery, pathology, and medicine, she will have more than enough to study during her three years' training. If she really aims at being a successful nurse, she must work hard with her hands as well as her head. In the hospital she will find the material for study, and such aids to it as lectures and teaching can give. But the learning and application must be done by herself. In nursing, as in all other professions, education must be the work of the pupil, aided and guided by the teacher.

At the close of her term of training the nurse is a very different woman from the candidate who entered three years previously. Her life in hospital may have had one of two results. She has either improved, or deteriorated. She is either more intelligent, sympathetic, and unselfish, or she has become dull, mechanical, and self-absorbed. To some extent the responsibility for the change rests with the people under whom she has worked, but in the main she must look to herself.

If she is willing to work mechanically, glad when each day's work is over, learning only enough to enable her to pass the examination, she will leave her training-school fit only to work with the rank and file—a mere drudge. This is the kind of nurse who so often brings her profession into disrepute; for to a curious ignorance she often unites a most consuming confidence in herself. She it is who criticises the treatment of the medical attendant,

and presumes to disapprove of it. The profession is indeed overstocked when it holds one such nurse.

But if during her probationship the nurse has worked loyally, conscientiously, and intelligently, using to the utmost her enormous sources of information, recognising her responsibilities, and keeping herself at the same time alive to outside interests, she will be a more intelligent, capable, and sympathetic woman. She will more readily assimilate new ideas; her grasp of life will be firmer, and her mind will be broader. Recognising her limitations, she will be averse to taking unnecessary responsibility on herself. She is, in fact, the loyal assistant that a nurse ought to be to her physician and surgeon.

CHAPTER II.

THE HYGIENE OF THE WARD.

HYGIENE is "the science which treats of the preservation of health." As applied to any room, it includes proper lighting, thorough ventilation, and sufficient warming. Light, warmth, and fresh air are all es sential to the maintenance of good health. How necessary, therefore, must they be to those who are ill!

One of the most important of a nurse's duties is to keep a careful eye upon the hygiene of her ward. More than that, her eye must be intelligent. It is the want of this latter quality, combined with ignorance of the first principles of ventilation, that renders so many nurses incapable of providing their patients with a constant supply of warm fresh air. They fail to realise the immense importance of a pure atmosphere. Many a nurse thinks far more of keeping the air away from her patients than of letting it get to them. She has a righteous horror of draughts, and unfortunately, in her anxiety to exclude them, she shuts out fresh air. She shares with the general public the superstition that anybody who has a high

temperature must be carefully guarded from the air, or he will take a chill. Experience teaches a very different lesson.

In many a campaign it has been found that the wounded who were crowded together in hospitals and other buildings were decimated by pyæmia, erysipelas, and hospital gangrene; whereas those who were placed in tents, or rough shelters hastily thrown up for the purpose, escaped these diseases. They did so because, from the nature of their surroundings, they were constantly exposed to draughts of fresh air, which swept away the germs and other impurities. On the other hand, their better-housed but less fortunate comrades, under the influence of deficient ventilation, fell easy victims to the diseases just mentioned.

Changes produced in Air by Respiration.—Air consists almost entirely of two gases—oxygen and nitrogen. Of the former there is rather more than one-fifth; of the latter slightly less than four-fifths. There is, in addition, a minute trace of a poisonous gas called carbonic acid, and a small quantity of watery vapour. Such is the composition of pure air. We cannot improve on it. A nurse should therefore endeavour to keep her patients constantly surrounded by an atmosphere which shall as closely as possible resemble it.

The air which we breathe out of our lungs differs very considerably in composition from that which was taken in. A considerable proportion of the oxygen has been absorbed by the blood-vessels of the lungs. In exchange for it, they have parted with an equal quantity of carbonic acid gas, a small quantity of various other impurities, and some water which

escapes as vapour. An atmosphere composed of such air as this is quite unsuited to support life. It contains far too little oxygen, and far too much carbonic acid and other impurities. Every individual in a ward is constantly engaged in removing oxygen and adding carbonic acid to the air of the ward. The atmosphere is rendered still more unwholesome by emanations from the patients' bodies, their linen, and excreta; by any foul wounds or soiled dressings there may be in the ward; and by the burning of gas. Each jet of gas consumes many times as much oxygen as a man. To counteract such a continual fouling of the atmosphere, a frequent and thorough changing of the air is necessary. Merely diluting the bad air with good is not enough: the former must be swept out of the ward, and the latter allowed to take its place. Ventilation should be sufficiently thorough to completely renew the air in a ward at least three times in every hour.

Principles of Ventilation.—It is highly important that nurses should understand these principles, for if they do not how can they intelligently regulate the ventilation of their wards? There are two simple but all-important facts to be remembered.

(1) *Air expands when it is heated.*—From which it follows that, as the hot air in a room expands, some of it escapes from the apartment by the nearest outlet.

(2) *As a Result of its Expansion, Hot Air is lighter than Cold Air.*—A balloon rises because it is filled with a gas that is lighter than air. So hot air, being lighter than cold air, will rise, while the latter, being heavier, will fall.

From these two facts we learn that in a dwelling-room the hottest and foulest air must be situated in the upper part of the room, close to the ceiling. Further, that any cold air which enters the room has a tendency to fall downwards towards the floor. After being warmed, it in its turn expands and moves upward.

In ventilation our object is to hasten the removal of the hot foul air, and so to regulate the admission of the clean cold air that it shall not fall directly upon the occupants of the room, and thus lead them to complain of a draught. If possible, the chill must be taken off it before it reaches them; at the same time, an ample supply of pure air must be secured. How to bring about this desirable result is the next point for consideration.

Foul Air escapes from a Room—

(*a*) By the fireplace.
(*b*) By the windows.
(*c*) By ventilating outlets.

(*a*) *By the Fireplace.*—In an ordinary dwelling-house the chimney is the great place of exit for the air of each room. Hot air, being lighter than cold air, tends to ascend. Hence the air in the chimney, being heated by the fire, moves upwards, its place being taken by a fresh supply drawn from the room. There is thus a constant current of air leaving the apartment by way of the fireplace, which is consequently a most important aid to ventilation.

(*b*) *By the Windows.*—The air which is in contact with the ceiling, being the hottest in the room, has a strong tendency to escape by any channel which is open to it. Consequently, if the windows are open

from the top, this hot air will stream out of them, its place being taken by air from the lower and cooler parts of the room.

(*c*) *By Ventilating Outlets.*—If these are to be used for the removal of hot foul air they must be placed in the uppermost part of the room, where that air is situated—*e.g.*, in the ceiling. A common and useful plan in a ward is to have them directly over the gas-burners, so that the stream of hot air which these produce may move upwards into the outlet above. In private houses an outlet for foul air, leading into the chimney, is often made in the wall of the room above the fireplace.

Fresh Air enters a Room—

(*a*) By ventilating inlets.

(*b*) By windows.

This is the more difficult part of the problem, since a constant and thorough supply of fresh air must be obtained, while draughts, if possible, must be avoided. At the same time, nurses must remember that *fresh air is the prime consideration*, and that it must be obtained at all costs. In a hospital it is impossible altogether to avoid draughts, unless the air is warmed on its way into the ward.

(*a*) *By Ventilators.*—If the air can be warmed on its way into the ward, these should be placed near the floor. In many of the more recently built hospitals there is behind and below the bed of each patient a large opening in the wall, leading direct to the outside air. In front of the opening is a coil of pipes, containing steam or hot water. As air enters the ward by this opening, it is warmed by the pipes. Each patient is thus enveloped in a constant stream of

fresh air. This method of ventilation is only possible when there are hot pipes to warm the air as it enters the ward, otherwise an intolerable draught would be produced in cold weather. In the absence of hot pipes the cold air must be introduced into the ward above the level of the patients' heads, so that it reaches them after mixing with the warm air in the ward.

(*b*) *By Windows.*—The windows have already been considered as an outlet for foul air; they also act as inlets for a large quantity of clean air, especially in windy weather. At such a time air rushes in from the side against which the wind is blowing, flushes the ward, and then leaves it by the opposite windows; it is therefore most imperative that the windows should be *constantly* open at the top, to allow of the escape of bad and entrance of good air: opening them at the bottom is not by any means so useful, besides producing a very unpleasant draught. Fresh air will also enter an apartment every time the door is opened, and underneath it even when it is shut. The door, however, should not as a rule be regarded as a means of ventilation.

The Nurse's Duty with regard to Ventilation.—Having explained the principles of ventilation, and the more common methods by which they are carried out, we must now consider the practical application of these principles by nurses in their different spheres of work. The method of application will differ somewhat according as to whether that sphere of work is in a hospital ward or a private sick-room.

(1) *In a Hospital Ward.*—Here the chief consideration is the constant flushing of the ward with fresh

air, so that germs and other impurities may be swept away.

We have seen that impure air escapes from the ward by the chimney, through any windows which may be open from the top, and by ventilating outlets in the ceiling, while fresh air enters through the various ventilating inlets and windows. We have also seen that one of the best methods of supplying patients with a constant supply of fresh air is by means of a large opening in the wall at the back of each bed, with a coil of hot pipes in front of it. This latter method of ventilation is absent from many of the older general hospitals. The only ventilators with which they are provided are wooden tubes (Tobin's tubes, six feet high, placed against the side of the wall, communicating below with the outside air), and apertures in the upper part of the walls. These furnish the wards with a supply of fresh air which is quite inadequate to the needs of its inmates. In such a case it is of the highest importance that the windows should be constantly open at the top, so that foul air may escape and fresh air enter to take its place. This necessarily entails a certain amount of draught, such a large quantity of cold air being introduced that it cannot be warmed before it reaches the patients.

In the absence of instructions from the doctor or sister, a nurse must be very slow to close any of the windows on account of a draught. If a patient complains of feeling cold, she should give him another blanket, a hot bottle, or a drink of hot milk, instead of at once commencing to shut out fresh air.

A good fire must be kept constantly burning in the cold weather, not only for the sake of warmth,

but also for the help that it is in ventilation by drawing foul air out of the ward.

A nurse should not regard the door of her ward as a means of ventilation. In many of the older hospitals the only result of leaving the door open is to allow the close atmosphere from badly lighted and ill-ventilated passages to invade the ward. In the more recently built hospitals, with broad stone corridors well provided with windows, this objection does not hold good; at the same time it must be remembered that an open door is capable of producing a very unpleasant draught.

In fever hospitals thorough ventilation is of even greater importance than in general hospitals. Filled as they are with cases of infectious disease, it is absolutely essential that the wards should be constantly flushed with fresh air, so as to ensure a frequent changing of the germ-laden atmosphere. In these institutions a nurse must pay even less attention to draughts than she would in a general hospital. Before everything she must place ventilation.

(2) *In a Private Sick-room.*—In attempting to ventilate a sick-room, a nurse frequently has to contend with the prejudice of its occupant against anything in the nature of fresh air. This must be overcome by carefully guarding against a draught, otherwise the patient will begin to talk about taking a chill, and insist on having every aperture by which fresh air can enter closed up.

Ventilation must not be attempted by leaving the door of the room open, since that will only admit air that has already been used in other parts of the house, whereas what the patient wants is the purest

air that can be obtained. This refers more especially to cold weather. In summer it is often impossible to keep a room cool unless both door and window are wide open. In such weather, however, windows will be open all over the house, and plenty of fresh air will be able to enter. Except for an odd ventilator or two, the window is the only channel by which the nurse can introduce fresh air into the sick-room. Unless the weather is very cold, or there is much noise outside, it must be kept slightly opened from the top, the patient, when necessary, being shielded from a draught by screens. In summer it can be opened top and bottom.

In cold weather fresh air can be introduced by keeping the lower sash slightly raised by a long piece of wood which fits closely between it and the sill, or, if the sill is deep enough, the sash may be raised until its lower margin is just covered by the upper edge of the sill, thus dispensing with the strip of wood. In this way a space is left in the middle of the window between the two sashes through which air can enter in the upward direction, and pass all over the room without causing a draught.

When possible, the patient should be covered up, and the windows thrown widely open three times a-day, so as to ensure a thorough changing of the atmosphere. This is especially necessary after the bowels have been opened. To rest satisfied with the concealing of a bad smell by means of perfumes is a great mistake, and one that may be productive of much harm.

If there is another room communicating with the patient's apartment, it can be filled with fresh air,

and then the door between the two rooms opened to admit it. This is merely an aid to ventilation: by itself, it is quite inadequate.

A fire should, if possible, always be kept burning, since we have seen how valuable an aid it is to efficient ventilation, especially in a small room. In summer, when it is too hot for a fire, a lighted lamp may be stood in the grate. This will produce sufficient heat in the chimney to start an upward current, and thus draw away some of the impure air from the room.

Temperature of the Ward.—In many of the older hospitals fires are the only source of warmth in the ward. In those of later date heat is also furnished by pipes containing steam or hot water. In a few hospitals these pipes are in separate coils, each of which can be turned on or off by the nurse, who should then be able to regulate the temperature of her ward to a nicety. Particular care is needed in the small hours of the morning, since that is the time when the air feels most chilly, and when the vitality of each patient is at its lowest.

The temperature of the ward should be kept as nearly as possible at about 60°. This can only be done by carefully watching the thermometer. Unfortunately, nurses are too fond of trusting to their own sensations instead of consulting that instrument. The consequence is that sometimes when they do look at it they find the ward 8° to 10° hotter than it should be. Doors and windows are instantly thrown widely open, with the result of a sudden fall in the temperature and a fair chance of somebody taking a chill. It is this sudden alteration in the temperature of the ward which is harmful.

There is no excuse for it while the nurse has such a thing as a thermometer.

The next point is to consider what a nurse should do when she is unable to control the temperature of her ward—*i.e.*, when it persists in falling too low or rising too high. She is told that to secure sufficient ventilation she must have good fires, windows open at the top, and doors shut—a very excellent rule, but one that not infrequently requires modification.

In many of the older hospitals, where fires alone provide warmth for the wards, one may sometimes in the winter-time see all the windows closed except one or two, and yet the temperature of the apartment below 60°. Under these circumstances it would hardly be right to open *all* the windows from the top, or the ward would quickly become unbearably cold. In such a case a nurse should obtain clear instructions from the sister or the medical officer as to the exact extent to which the ventilation is to be sacrificed to the warming of the ward.

(*a*) *When the Temperature of the Ward is too high.*—This, of course, does not refer to the heat of summer, but only to an excessive temperature produced by artificial means. 60° has been laid down as the proper temperature for a hospital ward. When it begins to rise above that point we must diminish the supply of heat. If the ward is warmed by hot pipes, the circulation through them should be partially or entirely cut off. If all the windows are open from the top, let them be lowered still more. If after a time the temperature shows no signs of falling, the fires must be allowed to go down. This should only be done after the other measures have

been tried and failed. Too often a nurse, when she finds her ward stuffy and hot, at once allows one or more fires to go out. That is a mistake, since the fire is helping to purify the ward by removing foul air from it. On the other hand, a nurse should burn as little gas as possible, since it quickly diminishes the purity of the surrounding atmosphere. Only as a last resource must the fires be allowed to go down. Even then a small fire should be kept in, since that, for the purpose of ventilation, is better than none at all.

(*b*) *When the Temperature of the Ward is too low.* —The nurse must not at once commence to shut the windows. Let her remember that they are to be used primarily for the purpose of ventilation, and only secondarily for regulating the temperature. Let her first make up the fires, and see that the doors are closed and all the hot pipes working properly. With every care, however, it is sometimes impossible in cold and windy weather to prevent the temperature of the ward from falling, especially if it is heated by fires alone. It is a little difficult to say at what point a nurse should begin to close the windows, supposing that she has first used every other means of making the ward warm — certainly not until the temperature has fallen below 56°, and then only after asking the doctor or the sister of the ward. Let her begin by closing one or two windows on that side of the ward on which the wind is blowing.

When the Temperature of the Ward has risen again to 60°, *the Nurse must gradually reopen any Windows that she has previously closed.* This she very frequently forgets to do.

Nurses must remember that the temperature of a ward is no guide to the purity of its atmosphere. A ward may be very cold and yet insufficiently ventilated.

The Temperature of the Sick-room.—In a hospital ward the temperature must be kept as nearly as possible at 60°, without regard to individual cases that might be benefited by more warmth. The temperature of the whole ward cannot be altered to suit them. In private it is otherwise. The nurse has now only one patient to think about, and she can therefore regulate the temperature of the room according to his needs; for there is no doubt that babies, old people, cases of measles, and those suffering from bronchitis, require more warmth than other patients. For them a temperature of 65° is more suitable than one of 60°; at the same time, extra care must be taken in guarding them against draughts. While using these precautions, the nurse must not forget the importance of efficient ventilation. Generally speaking, however, the temperature of the private sick-room, while the patient is in bed, need not be quite so high as that of a hospital ward. Except for special cases, 55° is quite warm enough.

Lighting of the Ward.—The more sunshine and light that a nurse can introduce into her ward the better for her patients. There are, of course, certain cases for which light is harmful, while no patient likes to have the sun glaring in his eyes. If it is doing so, the nurse must pull down a blind, not forgetting to draw it up again when the sun has passed. With these exceptions, sunlight does nothing but good: it is good both for mind and body.

Moreover, it helps to purify the atmosphere of the ward, since it is inimical to the growth of germs.

Finally, if a nurse wishes to do her best for the hygiene of her ward, she must see that excreta, soiled linen, and dirty dressings are at once removed; that bed-pans are always carried through the ward with a cover or a cloth on them; that the closets and various sinks are kept quite clean, and constantly flushed; that the water-closets are thoroughly ventilated, and the doors between them and the ward closed. She must have all her senses constantly on the alert. Each time that she enters her ward she should at once criticise the atmosphere and consider if it is in the least close or stuffy. While doing so she should glance round the ward and see that all the windows are open at the top, that the blinds are evenly drawn up, that the sun, if it be out, is not shining too brightly on any patient's face, and that the fires are burning properly, after which the thermometer will tell her whether the temperature of the ward is what it ought to be. Such a nurse has the hygiene of her ward at heart, and is therefore in one way doing her best to promote the wellbeing of her patients, and expedite their recovery.

CHAPTER III.

WORK IN THE WARD AND PRIVATE SICK-ROOM.

It is now a recognised axiom that a patient's recovery is best promoted by cleanliness both of himself and his surroundings. His body, his linen, the room in which he lives, and, above all, the air which he breathes, must be clean in the truest sense of the word. Surgery, medicine, and nursing all owe the immense advances which they have made in recent years to the recognition of this truth. The great aim of hospital construction and hospital work is the promotion of this general cleanliness. A nurse should, therefore, during her period of training, seize every opportunity of making herself thoroughly acquainted with the principles and practice of hospital work; so that she may know exactly what she ought to do when in private she finds a patient whose surroundings do not conform to that high standard of cleanliness to which she has been accustomed during her hospital career.

Furniture of a Ward.—This should consist only of what is absolutely necessary. There will thus be less chance of dust accumulating, and more chance of air circulating. Iron bedsteads with a wire spring and

a horse-hair mattress, a locker beside each bed, which might be constructed so as to form a bed-table, the necessary number of tables, one of which would be used by the sister as a writing-table, some comfortable chairs for convalescents and plain ones for the patients' friends, a couch, and the necessary number of screens, are all that is required. Poisons and stimulants should be kept in a cupboard outside the ward; or, if this is not possible, be locked up in a cupboard inside the ward, the key of which should be always in the possession of the sister, or, in her absence, of the head nurse. The ward may be rendered bright and cheerful by the addition of plants and cut flowers. The latter should not have too powerful an odour, and should be removed at once when their freshness has gone.

Linen.—The amount of linen in a ward should be in the following proportion: For each bed there should be three pairs of large sheets and three draw-sheets, three blankets and three pillow-cases, and in a ward of thirty beds fifty counterpanes. The number of towels, night-dresses, and other small articles will depend on whether they are supplied by the institution, or, as is usual in general hospitals in London, as far as possible by the patients. The sheets should be about six feet wide and nine feet long, and should be guarded by some distinguishing mark, such as a red or blue stripe, as well as the name of the ward and hospital, since this is easily cut out. The width is useful in turning the sides into the middle, which prolongs the life of a sheet. The blankets should be single, large, and of good quality. The counterpanes ought to be light and not closely woven, since they should be used merely for the sake of keeping the blankets

clean and giving a smart appearance to the ward, not with the idea of providing warmth.

The Staff of a Ward.—To keep a ward in a state of real cleanliness, without overworking any one, an adequate number of staff is required. In a ward containing thirty beds there should be a "sister," or head nurse, who would be at all times responsible for the management of the ward and condition of the patients. Under her authority, on day duty, one certificated nurse of three years' training, who would take her place in her absence; one staff probationer, in her second or third year of training, and two probationers in their first year. On night duty, one certificated nurse and one probationer. The two certificated nurses would take alternate day and night duty, three months at a time. There should also be one ward-maid to wash dishes, do the grates, and other rough work. The floors, whether scrubbed or polished, would be cleaned by outside help. Such a staff should amply suffice for the thorough carrying out of every detail of the ward work.

(*a*) *The Sister* should be a woman who has not only had a full training as a nurse, but has shown qualifications suiting her for a post of responsibility. She should be a methodical and capable manager, economical and just. She should see that the hours of coming on and going off duty are strictly observed by her staff. The tone of the ward is in her hands, and it should be her constant endeavour to render it as high as possible. She should discourage anything like familiarity between the nurses and adult patients, otherwise the discipline of the ward must suffer. She should herself be most fastidiously clean and neat, both

personally and in her work, and punctual to the second. She thus sets her subordinates a good example, giving her the right to expect as much from them. She should do all that lies in her power to help the nurses to learn their work, and in all her dealings with them observe a strict impartiality.

(*b*) *The Certificated Nurse* is responsible for the work of the ward in the absence of the sister. She must therefore make herself thoroughly acquainted with every detail of its management, so that the work may not suffer during the temporary absence of its head. In all her work she must ever regard the sister's wishes, and not her own views. She should always be ready to help and to teach the probationers, and in every way encourage their interest in the work and their loyalty to the sister. At the same time, she should remember her position in the ward, and exact a proper respect from them, never tolerating anything in the nature of familiarity, while careful not to make too constant a display of her authority.

(*c*) *The Probationers.*—The probationer, too, has her responsibilities, though they are less heavy than those of the sister and head nurse. She must perform her allotted duties conscientiously and to the best of her ability, never failing to report to the head nurse any fresh symptom which she may observe in a patient, or any complaint that one of them may make. Above all, from the very commencement of her training she must cultivate the habit of tidiness and her powers of observation. She should be constantly on the watch to see that everything is in its proper place, and, if it is not, should at once put it there, without waiting to be told to do so. She must remember that she is

working in a charitable institution that has almost certainly considerable difficulty in making both ends meet, so that rigid economy is absolutely essential. If she has omitted any portion of her duty, let her report it at once, and not wait for it to be discovered; for her neglect, if it have anything to do with the treatment of a patient, may entail serious consequences if left unremedied. She should never discuss either the medical officers or their treatment with the patients; and, while being kind and sympathetic to the latter, should remember her position, and always conduct herself with a proper decorum. A probationer should never be afraid to ask the head nurse to explain to her anything which she does not understand.

(*d*) *The Night Nurse.*—The responsibility resting upon the night nurse is necessarily heavier than that of the day nurse. She has of course the night superintendent to whom she can refer, who will decide whether it is necessary to call up the medical officer in the event of any patient showing a change for the worse. At the same time, for a good part of the night she is left entirely to herself, and may have to settle many little points which on day duty would be referred to the sister of the ward. It is essential, therefore, that she should be both careful and resourceful, and able to tell at once if a change for the worse takes place in any patient. She must also be conscientious, otherwise, when tired, she may be tempted to an imperfect performance of her duties.

The Work of the Ward.—There is no need to speak of the work of a ward in detail. Each hospital has its own method of arrangement, and even

each sister has her own routine and plan for the proper carrying out of standing orders. There are, at the same time, one or two general points which it is as well to emphasise.

The nursing staff should go on duty at the precise moment laid down in the regulations, and at once get to work. Valuable time is often lost at the beginning of the day by gossiping, instead of getting steadily to work and leaving talk for the latter part of the day, when there is less to do. Work should not only be begun at the proper hour, but, with rare exceptions, it should be finished at the proper time. Except in urgent cases, for which no rule can be laid down, nurses should endeavour to do their work in the same routine, and at the same time each day. This is what we mean by method, the possession of which enables one nurse to do so much more work than the best-intentioned woman without it. Nurses will find that the best method includes the habit of cleaning up as they go, putting away everything when they have done with it, clean, neat, and in its proper place.

Punctuality and orderliness are not of themselves sufficient to ensure that the work of a ward shall be performed in a perfectly satisfactory manner. These qualities by themselves would not produce the best work. Coupled with them must be a feeling of good fellowship between the nurses, so that they are willing to help one another; and also a certain pride in the ward, leading each nurse to be anxious for its good name. Under these conditions the work becomes a pleasure, and is, moreover, the best that each member of the staff can give.

Courtesy and kindness will always help to smooth

away difficulties. Nurses have many opportunities of helping one another, and should always be ready to do so. They should strive to be courteous to every one. A nurse, for instance, ought never to remain seated when the sister or head nurse who is speaking to her is standing. She ought always to rise when one of the medical officers enters the ward, and not sit down again until he has left. When a patient asks for anything she should fetch it at once, and not wait until it suits her convenience to do so. She should always be ready to show some little attention to a new patient, so that he may the more quickly feel himself at home. With the friends of those who are sick she should always be patient, and never let them think that she in any way considers them a nuisance.

Convalescent patients are usually anxious and willing to help in the work of the ward, and there are many light tasks that can be safely given them to do. Such help must, however, always be voluntary on their part.

Bed-making.—A nurse should of course be quite familiar with the making of a bed and the changing of sheets, and as this can only be taught in a ward it need not be described here. The mattress must be protected by a long macintosh, should the nature of the case make its being stained even remotely possible. The bottom sheet should be put on evenly, and tucked under the mattress so tightly as to present the appearance of a drum-head: this is essential to a well-made bed. The draw-sheet, which may also have a macintosh under it, should be laid carefully and neatly across the bed and firmly tucked in; no wrinkles should appear on either of these

sheets. The macintoshes are only used as a protection to the mattress, and should be withdrawn as soon as they are felt to be unnecessary. The upper bedclothes should be light and warm. The sheet should be turned up at the bottom to preserve a clean end, and over the blankets at the top. The upper corners of the blankets may be folded over to keep the bed tidy, and the counterpane should be put on evenly and neatly. The upper clothes should not be tucked in so tightly as to prevent the patient moving his feet freely, while the pillows should be arranged to suit the ease of the patient and not the eye of the nurse. Only the upper half of the pillow should rest on the bolster. The lower half should lie below the bolster, so that it may support the patient's neck and shoulders. He would then be much less likely to slip down into the bed. The test of a well-made bed is that it should be both neat and comfortable, and retain these qualities throughout the day or night.

After each meal the draw-sheet should be drawn, so that the patient lies in a cool spot. The mattress should, when possible, be turned once a-day, and the bed thoroughly made twice a-day. Well-made neat beds, each exactly like the others, standing quite straight, with all the counterpanes arranged the same length and in the same way, give a smart appearance to a ward, and nurses are at times apt to sacrifice their patients to this appearance. The condition of the bed must to some extent depend on the severity of the case; and, though patients may be encouraged to keep their beds tidy, this must never amount to tyranny. Nurses are apt to forget that at night

the appearance of the beds is a matter of no consequence whatever. There should be no hesitation in turning back the counterpane, and loosening the blankets, when a patient is hot and restless.

Air- and Water-Beds.—These are most useful when a patient has a bed-sore, or if from the nature of his illness there is a possibility of his having one.

The best and handiest is the tubular air-bed, consisting of a number of stout rubber tubes which should be arranged crossways. Each of these has to be inflated separately, the whole being connected together by a strong light framework. It has the advantage that an injury to the bed, such as a pin-prick, is limited to the one tube in which it occurs, which can easily be taken out and repaired. It is useful, too, to be able to let the air out of one tube at a time, and thus take all pressure off a part. The same device makes the use of the bed-pan much easier.

A water-bed is necessarily much heavier than an air-bed. After being placed in position on the bed, it is filled with water at a temperature of 90°. Some judgment must be used with regard to the amount of water put into it. If the bed is made too tense, the patient will tend to roll off it. If it is not full enough, his weight will displace the fluid, with the result that he will rest, not on water, but on the bed beneath it. A blanket should be placed on the water- or air-bed, and on that the ordinary bedclothes. When necessary, some of the water must be periodically removed and replaced by hot. These beds must be thoroughly cleaned after use, and great care taken to avoid damaging them with pins.

Bed-pans are usually made of glazed earthenware, as this is very easily kept clean. The commonest and most useful shapes are the circular and the slipper. The round pan is generally used in hospitals, as there is less likelihood of the contents being spilled than is the case with the slipper; and, as the patient must be lifted up to have it adjusted, it is less likely to nip the back.

If the patient is not absolutely helpless, one nurse can give it. She should place her hand almost under the buttocks, and help the patient to raise himself, the bed-pan being then placed in position. Before attempting to remove it, the patient should be lifted right off it. When giving the pan, some disinfectant, such as carbolic acid (1 in 20), or perchloride of mercury (1 in 1000), should be put into it, unless the urine or stool is to be kept for examination, and the handle plugged with an india-rubber cork, or, failing that, with carbolised tow.

After use it should at once be covered with a china lid, over which is thrown a cloth wrung out of some disinfectant. It is then straightway removed from the ward, and, unless needed for inspection, at once emptied, the pan being thoroughly flushed with cold water. At least once a-day it should be washed with soap and water. The pan ought always to be warmed before use.

If there is any cause to fear a bed-sore, or if the patient is much emaciated, the rim of the bed-pan should be oiled, or protected by a circular air-cushion, one having been invented for that purpose.

Male patients only use the bed-pan when the bowels are going to act; for urine they use either a small

chamber or a bottle, the former being preferable, as it is the more easily kept clean. It should be removed from the ward as soon as it has been used, and washed once a-day with soap and water. The urine bottle is difficult to keep clean, being apt to become furred and offensive.

Dusting.—This, as usually done, means that different parts of an apartment exchange dust. Practically none of it is removed. To avoid this, two dusters should be used, one damp and the other dry. The damp one takes up the dust, while the dry one afterwards renews the polish. Dusting should be done thoroughly and systematically every morning, and no temptation should lead a nurse to overlook any corner of the ward.

The ward floor, which should be of hard polished wood, should be carefully swept every morning by the ward-maid, as little dust as possible being raised in the process.

The Lavatory and Bath-room should be attended to each morning. The wash-basins, bed-pans, urinals, and china bowls should be washed with soap-and-water, such parts as the handles and round the insides of bed-pans and urinals being carefully looked to. The sinks and water-closets must also be washed with soap-and-water and thoroughly flushed. No amount of other work excuses the neglect of this.

Weekly Cleaning. — Besides the daily cleaning, there are various matters which need only be attended to once or twice a-week. The window-ledges should be polished twice a week with bee's-wax and turpentine, and rubbed over daily with a clean cloth. Once a-week the cupboards, cupboard-tops, shelves,

and pulley-handles should be scrubbed and cleaned. Every corner of the ward should be inspected by the sister, to see that it is, like Cæsar's wife, "above suspicion." Every corner and cupboard should be found absolutely clean.

The Private Sick-room.—The ideal sick-room is a large, bright apartment with a south or south-west aspect, big windows with a cheerful outlook, and a good-sized dressing-room opening out of the bedroom. Both should possess a fireplace. The walls should be thick, and the doors and windows well hung. The floor should be of polished hard wood, with rugs, and the furniture comfortable if scanty. The walls should be of restful green, the pictures cheerful, the ornaments few but well chosen; the bed single, iron, with a good spring and a well-made hair mattress.

It rarely falls to the lot of the nurse whose work lies among the middle classes to have her patients in such quarters as these. More frequently she has to make the best of a room possessing but few of the above good points. In surgical cases, where a room has to be prepared for an operation, her opinion may be asked, and she should be prepared to give an efficient one. The apartment chosen should be as far as possible from the scene of daily domestic duties and from outside noise.

Having secured the best room possible, the nurse should satisfy herself that its fittings are in good working order; that the windows open and shut easily—if not, how to open and shut them with the least noise; that the blinds fit properly; that the chimney does not smoke; that the door closes noiselessly, and the handle turns gently; if the floor is

covered with carpet, that it is well laid and clean—if polished, that the rugs or central square of carpet are secured, so as to afford her firm foothold. Curtains are best dispensed with, as they tend to keep out both air and light, but, if necessary, are best made of dimity or other easily washed material.

The floor should be polished, and covered with a central square of carpet or rugs firmly secured by carpet-pins. It should be thoroughly cleaned each morning. If polished, it should be wiped first with a damp duster and afterwards rubbed well with a dry woollen cloth. If the illness is a long one, the floor can be rubbed over with polish once a-fortnight. If there is a carpet in the room, it should be swept each day, having first been covered with tea-leaves or damp sawdust, a disinfectant being used when thought necessary. If, however, the sound of sweeping annoys the patient, the floor should be rubbed over first with a wet cloth, and afterwards with a dry one, and thoroughly swept once a-week.

The Furniture of the Sick-room should consist of nothing more than is necessary for the comfort of the patient and cheerful appearance of the room. Besides the bed, which should be placed so that the nurse can get at her patient from either side, a bed-chair, a table, and a bed-table, one or at most two comfortable chairs, a good light screen, and, if there is no dressing-room, a roomy cupboard where medicines and other sick-room paraphernalia may be kept. The room should be cheerful, and as little suggestive of a sick-room as possible. A few plants, and cut flowers of not too strong a scent, are permissible. The latter must be thrown away on the first sign

of fading, and the water in which they are placed changed every day.

When working in private a nurse should always endeavour to be quiet, but at the same time her quietness must not be of the painfully obtrusive type. Her shoes must not creak or her voice be loud; while, if the patient is annoyed or disturbed by the slightest noise, she should put on coal with her hands, protecting them with an old pair of gloves, and use a wooden poker to stir the fire. On the other hand, she should never creep about the room on tiptoe, or whisper, unless the patient is asleep, otherwise she will almost certainly irritate him.

CHAPTER IV.

PERSONAL CARE OF THE SICK.

THE admission of a new patient to the ward is at once reported to the sister in charge, who in many hospitals decides whether he is to have a bath, or, being too ill, must be washed in bed. The former is naturally preferable. In either case the pulse and temperature would be first taken, and any special symptoms noted.

Bathing a New Patient.—In the male wards this is always done by a male attendant, in the female wards by one of the nurses. The head nurse should afterwards examine such parts as the nails, knees, and elbows, to assure herself that the cleansing has been efficiently done. The bath should be given methodically and quickly, so that the patient may be exposed as little as possible. If the patient is very dirty, the water should be changed more than once, a few drops of ammonia or a little powdered borax being added to it.

It is best to begin with the feet and legs, hands and arms; then change the water, and wash them again together with the body. The head should always be

taken last. Soap should not be rubbed on it, but on the flannel, the hair being afterwards thoroughly rinsed. If the knees, elbows, heels, and hands are very dirty, and cannot be cleaned by the application of soap-and-water, they may be rubbed with turpentine, which must afterwards be carefully washed off, or a plain hot-water fomentation may be applied for a few hours. The bath should be given at a temperature of 100°, the patient being afterwards thoroughly and quickly dried with a warm towel, and at once put to bed. If a female, a bath-towel or blanket is laid on the pillow and the hair combed out on it, after which the towel or blanket is folded over, and pressed down on the hair, which will thus quickly dry without giving the patient cold.

Bathing a Patient in Bed.—If the patient is too ill to be bathed, he or she may be washed in bed.

Having turned back the bed-clothes, a long mackintosh covered with a blanket is laid on the under sheet. The edges of the blanket should overlap down the middle of the patient when he is laid on it. His clothes are now removed, care being taken to keep him covered.

For washing, two basins are necessary—one large and one small, two flannels, a piece of soap, and two towels. The small basin is used for soapy water, which must afterwards be thoroughly washed off with the water in the larger basin. The temperature of the water should be between 105° and 108°, as it cools quickly.

The face is washed first, the body being taken afterwards in small sections, each being carefully dried and covered with the blanket before the next

is begun. In this way the front and sides of the body, shoulders, arms, and hands, are washed. The water is now changed, and, when possible, the patient turned on his side, and the back, from the nape of the neck to below the buttocks, thoroughly cleansed and dried; after which the legs and feet are washed, and the water again changed for the head. If the knees, elbows, or heels are very dirty, they may be treated as previously recommended, care being taken afterwards to completely remove the turpentine.

When washing the head, the basin should be brought close to the bed, and as much on a level with the patient as possible. The hair is then well rubbed with soapy water, and afterwards thoroughly rinsed in clean water in the large basin. If the head is pediculous, it should be combed with a small-tooth comb, which is dipped into 1 in 20 carbolic every time it is passed through the hair. When the hair is very dirty, it is best to cut it off close to the scalp; but this can only be done with the patient's consent, or with a written order from the physician. If permission cannot be obtained to cut long hair which contains a large number of pediculi, it is best treated in the following manner: Thoroughly saturate it with carbolic oil, rubbing this well into the roots of the hair, and afterwards cover it entirely with a pad of absorbent wool soaked in the same. Over this place a large square of lint, or oiled paper, outside that more wool, especially at the nape of the neck, and bandage the whole firmly in position. At the end of twenty-four hours it should be removed, the head thoroughly washed with soap and soda, and the dead lice combed out. It is a good plan, if a head is teem-

ing with lice, to put on the carbolic dressing at once, and wash the patient afterwards. This will prevent the lice escaping from the head. For the removal of nits each nurse has her own pet remedy, which she thinks the only one that is really efficacious. Turpentine, vinegar, methylated spirit, mercurial lotions, and other preparations are all said to bring about this highly desirable result. It is very doubtful if one has more power to do so than any of the others.

In washing a patient, the nurse should pay particular attention to such parts as the ears, eyes, nostrils, axillæ, umbilicus, the part between the buttocks, the groins, knees, heels, and in stout women under the breasts. In fat people the skin under the breast, and also that between the buttocks, should be powdered twice a-day.

While giving a bath, the nurse should note any lumps, scars, or sores there may be on the body, and subsequently report the same to the sister. She must also carefully look for and report any scaly patches on the scalp that might be ringworm, as it is most important that this should be detected at once, and not allowed to spread in the ward.

Directly the bathing is finished, the patient is put comfortably to bed, a hot-water bottle being given him if necessary. An hour later, when he has quite settled down, his pulse and temperature are again taken.

The patient's clothes should be carefully examined, those that are dirty or contain parasites being sent to the laundry and disinfecting chamber respectively, the others being tied in a neat bundle and disposed of according to the arrangements of each particular hospital.

Daily Wash.—Each morning, the upper bed-clothes and sheet having been folded back, and the nightdress removed, the patient should be washed to the waist, back and front, lying the while between two blankets, or between a blanket and a warm bath towel, the latter being placed between him and the under sheet. It is best done with two basins, that no soap may be left on the skin. This thorough washing should be done every morning; the hands should be washed in the middle of the day, and the hands and face again washed at night before the bed is made.

The hair is then brushed and combed. In the case of women it is best to divide it down the middle of the back of the head, and plait in two tails behind the ears, taking care to begin the plait rather low down, so that the patient will not have it between her head and the pillow. It should be well brushed each day. The brushes and combs must be kept clean by being washed at least once a-week. When a patient who has had ringworm of the scalp leaves the hospital, his brush and comb ought always to be burnt.

Heads that were pediculous on admission, or contained nits, must be carefully examined and combed every day, so as to ensure the prompt destruction of any lice that may be hatched.

In private work a nurse should always endeavour to make her patients look as nice as possible, and not be above devoting some pains and attention to the doing of women's hair.

The Teeth.—If the patient is too ill to attend to his teeth himself, the nurse must do so for him. She should provide herself with several small pieces of stick about the size and thickness of a pen-holder.

Round one end of each is to be wrapped a thin shred of absorbent wool or a narrow strip of lint. This must be done firmly enough to prevent either coming off in the mouth, but not so tightly as to interfere with their easy removal from the piece of stick. More commonly the lint or wool is wrapped round the forefinger or a pair of dressing forceps. The lint or wool should then be dipped in a solution of boracic acid, lemon-juice water and glycerine, or dilute Condy, and the gums, tongue, roof of the mouth, and both sides of the teeth thoroughly rubbed, each piece of lint or wool being used once and only dipped into the mouth-wash when clean. Of these mouth-washes Condy is the least pleasant to the patient, but is useful when the breath is foul. When the teeth are very dirty, dipping the wet wool or lint into prepared chalk before rubbing them will materially hasten the cleansing process. Convalescents should be made to use a tooth-brush, small children having their teeth brushed for them by a nurse, who must do so very gently to avoid injuring the gums.

In specific fevers, or any disease which causes a high temperature, the teeth demand most careful attention, as they become covered with sordes, which gives them a very dirty appearance.

Sordes are the secretions of the mouth which have collected upon the teeth and dried there. In health they are removed, or rather prevented from collecting, by the process of mastication and by the continual movements of the cheeks and tongue, which aid in keeping the teeth and tongue clean. In acute illnesses the mouth ought to be cleaned as often as

every four hours, in less severe cases once or twice a-day may be frequent enough.

The Eyes.—When suffering from extreme exhaustion, patients frequently sleep with the eyes half open, in consequence of which the conjunctivæ become irritated by dust. In such cases the eyes should be carefully bathed with boracic lotion.

Bed-sores.—In a small minority of cases a bed-sore is pardonable. As a rule it is the result of imperfect care on the part of the nurse. To prevent, as far as possible, the occurrence of this highly undesirable complication, every nurse should make herself thoroughly acquainted with the causes of bed-sores, their earliest symptoms and usual situation, and their treatment. While doing so, she will also learn how she may best guard her patients against them.

Bed-sores have a great tendency to form on those parts in which the circulation is feeble, so that the blood stagnates in the tissues, which therefore do not receive a sufficient supply of food; consequently their vitality is lowered, so that they readily respond to slight injuries.

Causes—

(*a*) *Pressure*—*e.g.*, when occurring over the lower part of the back, and on the heels, hips, and shoulders. Fat people are especially liable to this form of bed-sore, since their great weight, continually pressing the skin of the back into the bed, so interferes with its circulation that it finally sloughs or dies. Going to the other extreme, thin people are also very liable, because there is no fat to protect their skin from pressure by the bones.

(*b*) *Irritation.*—Constant friction so irritates the

skin that at last it becomes inflamed, a raw surface is formed, and a bed-sore is the result. This kind of bed-sore occurs on the elbows, back of the head, and inner sides of the knees and ankles, owing to their rubbing against one another.

Patients with incontinence of urine are prone to bed-sores, the skin of the part that is wet becoming sodden, and so readily yielding to pressure. Constant irritation by the urine also causes it to inflame.

Creases in the under-sheet and crumbs in the bed may cause sufficient irritation to produce a bed-sore.

(*c*) *Impaired Nutrition from Disease.*—All bed-sores result from impaired nutrition of the part, due to a weakening of the circulation in it, the result of the patient's illness and consequent confinement to bed. Under this heading is included that special impairment which goes with disease of the spinal marrow, and which is due to an interference with the nerve-supply of the part. This is the most difficult form of bed-sore to prevent; indeed, it is frequently quite impossible to do so.

We may say, then, that bed-sores are caused either by pressure, or irritation due to friction, predisposing factors being extreme emaciation, great weight, incontinence of urine and fæces, and the want of proper attention on the part of the attendant.

Prevention of Bed-sores.—When a patient who is stout suffers from paralysis, with incontinence of urine and sometimes of fæces, it requires unremitting care on the part of the nurse to prevent the formation of a bed-sore. No method of prevention is better than the frequent application of soap and water. A nurse should never wait for the patient to complain

of his back before beginning its use. Once a-day, at least, all patients who are confined to bed should have their backs and hips washed. The soap should be thoroughly washed off, and the skin well dried and powdered, particular attention being paid to the fold between the buttocks.

The skin may be treated after washing in one of the following ways:—

(*a*) Spirit in some form may be applied—methylated spirit, brandy, or eau de Cologne being used. Whichever is used must be thoroughly rubbed in. This will increase the flow of blood through the skin and so improve its nutrition.

(*b*) A solution of formalin, 1 in 100, quickly hardens the skin, but is rarely suitable.

(*c*) The part may be painted with flexible collodion. This is also used later, when the first signs of a bed-sore show themselves.

(*d*) Some emollient ointment may be well rubbed in.

By the first two methods the skin is hardened, and in illnesses which are not likely to last long it is a good enough plan. By the last method the skin is softened and rendered pliable, and the massage that is necessary to rub the ointment into it is good for the vitality of the part by improving the circulation in it. If, however, the nurse simply rubs the ointment on the skin, it is the less useful treatment, as it is very soon wiped off by the sheet, which it consequently renders greasy. In all cases where the sphincters are relaxed, the skin should be treated with ointment. This will protect it from the irritating effects of the discharges, the patient being always washed and rubbed when he requires cleaning.

Those parts which have been mentioned as liable to break down with pressure should be examined daily and regularly washed. The heels, which after the back and hips are the most likely to become sore, must be carefully attended to, pressure being taken off them by ring cushions made of wool and covered with a bandage, or the heels and ankles may have wool bandaged round them. Ring cushions made of wool are often recommended for the purpose of relieving pressure on the back, but are of very little use; indeed, with a restless patient they become a positive danger. Water- and air-beds, by equalising the pressure, are of the greatest possible value. In their absence, ring cushions constructed on the same principle are sometimes very useful. The knees, ankles, and elbows may be protected by firmly bandaging a thick layer of cotton-wool round them.

Second only to washing as a preventive measure is a change of posture. This not only removes for a time all irritation from the part, but is of the greatest possible value in preventing stagnation of blood in it. Pressure being taken off the vessels, blood is able to pass more freely through them, and thus bring more nourishment to the tissues. When possible, such a patient should never be allowed to lie more than two hours in one position, but be turned first on to one side and then on to the other, and kept there by the skilful arrangement of cushions.

Symptoms.—It is important that a nurse should be acquainted with the first indications of the on-coming bed-sore. The first obvious symptom is a reddening of the skin, but even before this appears the patient may complain of a burning or pricking sensation.

This should at once put the nurse on the alert. The patient may, however, be too ill to feel any discomfort; or, owing to paralysis, there may be no sensation in the part.

The sore, when formed, may consist of nothing more than an abrasion of the skin; or a large slough may gradually separate, leaving behind a deep cavity, frequently with bone exposed at the bottom of it.

Treatment.—The prevention of bed-sores is the duty of the nurse; but the first sign of one should be at once reported to the physician or surgeon in charge of the case. He may, if it results in nothing more than an abrasion of the skin, leave the further treatment in the hands of the nurse. In such a case a pad of lint dipped in friar's balsam may be applied, covered with three thicknesses of gauze cut a little larger and dipped in collodion. This seals the part, and prevents the sore being rubbed by bedclothes or irritated by extraneous matter. By every possible means the nurse must strive to keep all pressure off the bed-sore.

When a slough has formed, its separation should be hastened by the use of antiseptic fomentations. These are usually discontinued after it has come away, the cavity, if it be a large one, being sprinkled with iodoform, and carefully packed with gauze strips. Especial attention should be paid to the undermined edges. A shallow bed-sore might, when clean, be dressed with eucalyptus and vaseline, or iodoform ointment, or balsam of Peru may be applied. A bed-sore of any size, or one that is progressing, will require dressing at least twice a-day.

To sum up, the prevention of bed-sores in many

cases requires a care as unremitting as it is faithful. A day's neglect may undo the work of weeks, and add a very unnecessary burden of discomfort to the patient. The bed must be kept smooth, and no crumbs allowed to remain in it; the application of soap and water must be regular and efficient; if ointment is being used, it must be rubbed into, and not on to the skin; and the patient must not be allowed to remain too long in one position. In a word, the most unceasing care and attention must be exercised.

The Moving of Helpless Patients.—Every nurse should know how to properly move a patient, who is very weak or unconscious, from one part of his bed to another, otherwise she will drag instead of lifting him, which is much more tiring for her, and unpleasant for the patient. She should never try to lift by herself a patient who is obviously too heavy for her, or she will run the risk of hurting him, and perhaps seriously straining herself.

If a nurse wishes to raise in bed a patient who has sunk down off his pillow, she should place her right hand and arm well behind his back, and the left below the hips, and gradually move him up the bed. He should help himself with the pulley, if there is one, and he is not too weak. If he is too heavy or cannot assist her himself, another nurse, standing on the opposite side of the bed, will help, placing her arms in a corresponding position. As a rule, a nurse will need assistance when moving a helpless adult.

When a patient has to be moved across the bed, the nurse places her right arm in a slanting direction

behind the patient's back, so that his left shoulder presses against her right clavicle, while her fingers come round on to the right side of his chest. The left hand is placed across the front of the chest, beneath the right shoulder. The upper half of the patient is now slightly raised, and steadily moved across the bed. The two hands are now slipped downward, so that one lies in front and the other behind the hips, and the lower half lifted over.

To move a patient from one bed to another the two beds must be placed side by side, so that the mattresses are in contact; or one can be pulled a little way over, so as to bridge the interval between the beds. The patient is now slowly drawn across by the sheet on which he is lying, this being afterwards slipped away from under him; or, if there are enough assistants, he can be lifted, one taking each corner of the sheet.

Passing the Catheter. — Patients sometimes at first find a difficulty in passing water into a bed-pan. The position is novel and awkward, especially if the pillows are low, so that the bed-pan raises the pelvis, and with it the bladder, almost to the level of the shoulders. The nurse must exercise the utmost patience, not allowing her to remain too long on the pan at a time, but removing it and giving it again a little later. Especially to be deprecated is the custom some nurses have of leaving very small children on the bed-pan for several minutes by themselves, so that frequently they go to sleep in that position. In these cases one sometimes finds bruises over the vertebral column, owing to the child slipping down on to the bed-pan as it falls asleep.

When a male patient is unable to pass water, a fomentation applied to the lower part of the abdomen is frequently efficacious. In the case of women, a little hot water may be put into the bed-pan, or a hot sponge, quickly replaced by a cold one, held to the meatus. If this has no effect, it may become necessary to pass a catheter, but this would only be done by the physician's orders, and the patient may wait some hours before it is necessary.

When there is any risk of the urine shooting over the pan into the bed, it is a good plan to give the patient a piece of brown wool to hold in front, so that she may direct the flow of urine into the bed-pan.

The Catheter is a hollow tube 8 to 12 inches long, made of either gum elastic, indiarubber, glass, or silver. For women glass is the best, as it can be kept absolutely clean. When used, it should be in a state of surgical cleanliness — *i.e.*, aseptic. To render it so, it must be boiled for five minutes, and then kept till wanted in a 1 in 2000 solution of perchloride of mercury, or 1 in 20 carbolic acid. Before use, it should be dipped in sterilised water.

Being quite sure that the catheter is fit for use, the nurse should get ready a vessel in which to catch the urine, a basin of boracic lotion, some wool sponges, and some sterilised oil; after which she washes her hands, and soaks them in an approved disinfectant.

The patient is placed on her back, the knees slightly separated, and a blanket thrown over each. This keeps her warm, and prevents undue exposure. The nurse now separates the labia, and carefully cleanses the parts round the meatus with the wool sponges and boracic lotion. The catheter is then dipped in

the oil and introduced, care being taken by the nurse to touch only the part which will be left outside. The instrument should not be passed any further when the urine has begun to flow, as the nurse must be careful not to touch the wall of the bladder with it. If the urine ceases to flow before the bladder is empty, the catheter should not be pushed farther in, but slightly withdrawn and again replaced. If the bladder is very full, a small catheter must be used, as it should be emptied very slowly, or it may not be emptied entirely the first time the catheter is passed. As the catheter is withdrawn, the finger should be placed over the end of it to prevent urine escaping from it into the bed. The parts are then bathed and again dried. A strong stream of water should be run through the catheter from the eye. It is afterwards boiled, and then kept in a disinfectant solution.

When, for some reason, the knees may not be separated, the nurse in passing the catheter must trust to her sense of touch. The urinary meatus is situated just above the vagina, and can easily be seen or felt. It has a slightly thickened, rounded edge, and the nurse, by placing the first finger on it, can easily pass the catheter into it. Care must be taken not to pass it into the vagina. If this is done, the catheter must be boiled again, or another used.

It is highly essential that nurses should recognise the extreme importance of absolute cleanliness when passing the catheter. The careless use of an unclean instrument may introduce germs into the bladder, which will grow there and cause it to become inflamed—a most serious and painful condition, the

setting up of which every nurse should do her utmost to avoid.

Care of the Dead.—Soon after death the condition called *rigor mortis* begins to set in, as a result of which all the muscles of the body become stiff and rigid. In anticipation of this, the nurse, as soon as the friends have withdrawn, closes the eyes, when necessary retaining the lids in position with pads of wet lint, straightens the limbs, and closes the mouth. The lower jaw is supported either by means of a roller bandage placed under it, or by passing a couple of turns of bandage round the point of the chin and over the head. To prevent it slipping, the bandage should be split in the centre where the chin rests on it. When the muscles have firmly set, the support is removed.

About an hour after death the nurse should proceed to "lay out" the dead body. It is first washed all over with soap and water, and the rectum and vagina packed with absorbent wool to prevent the escape of discharges. The ankles are tied together with a broad strip of bandage, fresh dressings placed on any wound, the hair brushed and neatly done, and a night-gown put on. Before washing a patient in a hospital, any rings or earrings should be removed from the body and given to the steward of the hospital. In no case should the body be removed to the mortuary with any ornaments on it, nor should the nurse herself deliver them to the patient's friends, otherwise they may pass into the possession of the wrong individual. If the death has occurred in a hospital, the patient's name, and also that of the ward, together with the hour at which death occurred, are written

on a slip of paper, which is then pinned on the front of the nightgown. Over all a clean sheet is thrown. The body is now ready for removal to the mortuary.

In a private house the nurse should not hurry away directly she has finished laying out the body, but should wait to see if she can be of any further help to the friends. Before leaving the room, she should see that everything is in order.

CHAPTER V.

OBSERVATION OF THE PATIENT.

"THE most important practical lesson that can be given to nurses is to teach them what to observe, how to observe; what symptoms indicate improvement, what the reverse; which are of importance, which are of none." Further, a nurse must know how to report correctly and concisely what she has observed; otherwise, she will afflict the doctor with a wearisome redundancy of detail, in which the most important points in the case are either slurred over or left out.

When making a report a nurse should always strive to be exact and *give facts*. She should never talk vaguely about the patient "having slept badly," or "not taken so well," but should be able to say how many hours' sleep, or how many ounces of food, he has had. Again, she must strictly confine herself to those facts, and never, unless asked to, give her opinion on the case. A nurse who volunteers suggestions as to treatment or diagnosis does not know her place, and hence lays herself open to rebuke. A clear and brief reply in answer to each question is all that the doctor wants.

A nurse who can observe and report in this way is one who has had a thoroughly efficient training under skilled supervision, and profited thereby. She is a great help to the physician, since she is not infrequently able to supply him with missing links in the chain of evidence necessary for the completion of his diagnosis, besides informing him of the progress of the case during his absence. The following are points to which a nurse should direct her attention, both when she first sees her patient and while he remains in her charge. Those points which are more especially connected with the disease from which the patient is suffering will claim the larger share of her attention. At the same time, she should be acquainted with the explanation of any other symptoms that may arise in the course of the illness, and it is of great importance that she should learn to distinguish symptoms which are dangerous from those which are not; for at any time she may have to decide on her own responsibility whether the change in her patient is sufficiently serious to warrant her in sending for the doctor, or whether she would be justified in waiting till the time of his usual visit. Let her never forget that it is only by constant and careful observation of her patients, together with ability to interpret what she observes, that she can ever become a thoroughly trustworthy and competent nurse.

Appearance of the Patient.—Does the patient look ill or in pain? Has he the heavy, listless expression of enteric fever, or the wide-awake, anxious look of pneumonia and pericarditis? Has he the shrunken, hollow-eyed, anxious face which accompanies acute peritonitis? Is he pale or flushed?—sudden pallor

coming on in a case of enteric fever or gastric ulcer is usually due to severe internal hæmorrhage. Is there a bluish tinge about the lips, cheeks, and edges of the ears, due to imperfect oxygenation of the blood, the result of either heart or lung disease? Does the patient look well- or ill-nourished? Does he look older or younger than he says he is? Is there any obvious deformity or weakness of any part of the body?

Position in Bed often gives most useful information. A patient naturally lies in the position which gives him most ease. If he has peritonitis, he will lie quite still on his back, with the knees drawn up to relax the abdominal muscles, and so take off all pressure from the inflamed and tender parts within. Colic, on the other hand, while it makes him draw up his legs, tends to produce restlessness, and, contrary to peritonitis, is relieved by pressure, so that the patient forces his hands into his abdomen, or even lies on his face. Difficulty of breathing, whether due to heart or lungs, makes him want to sit up. If he has pneumonia or pleurisy on one side of the chest, he will lie on that side, as by doing so he lessens its movement and thus diminishes pain, while at the same time it gives the unaffected lung a better chance of working. A patient with heart disease often prefers to lie on his right side, as this takes the weight of the liver off the heart. In the advanced stages of enteric fever he lies helplessly on his back, never moving of his own accord. When, after lying in such a position, he first begins to move on to his side, we may be sure that improvement has set in. Extreme restlessness, coupled with sighing, is a symptom of severe hæmorrhage, or

of heart failure such as is seen in the final stage of bad diphtheria.

Pain.—A nurse should always most carefully inquire into the character and duration of any pain of which the patient may complain. In endeavouring to estimate the severity of the pain, she must be on her guard against exaggeration by the patient, for to some people any pain is a bad pain. If there is really much suffering, the patient's face will show it, while the frequency of the pulse-beats will be increased. If the pain is very severe, the patient may lie still, being afraid to move. Severe pain in the præcordial region, spreading thence down both arms, indicates a most dangerous form of heart disease, which may straightway prove fatal unless relieved. Acute abdominal pain and tenderness, arising in the course of enteric fever, is in the great majority of cases due to that very fatal complication, perforation of the intestine. Both of these are cases in which the doctor should be sent for at once. In neither is the patient restless: he remains quite still, with anxious face, hardly daring to breathe.

When describing a pain to the doctor, a nurse should always endeavour to quote the patient's words.

The Skin.—The points to notice about the skin are scars, ulcers, abrasions, bruises, or discoloration; any swelling, œdema, or jaundice; the comparative moisture or dryness of the skin, and its temperature. Anything like profuse perspiration, occurring during the course of the illness, should always be reported, as it is sometimes a symptom of weakness; or it may be an indication that pus is forming in some part of the body.

Any scaly patches on the scalp should be reported, as they may be due to ringworm.

The Eyes.—Any irregularity in the size of the pupils, or tendency to squint, should be carefully taken note of, as it may point to grave complications, especially in a case where there is any suspicion of meningitis. In the very serious condition called "coma vigil" the patient lies unconscious with the eyes widely open. In cases of extreme exhaustion the eyes are sometimes incompletely closed during sleep, and hence are liable to irritation from dust or flies.

The Ears.—Pain in the ear, or discharge from that organ, should always be looked for in cases of diphtheria, measles, and scarlet fever, where the throat is inflamed. When the ear is discharging, any swelling or tenderness of the bone immediately behind it should be taken note of, as it is evidence of commencing inflammation in the bone, which, if not promptly and efficiently treated, may lead to serious complications. Singing in the ears and deafness, following upon the administration of quinine or salicylate of soda, should always be reported. A varying degree of deafness is almost always present in enteric fever. In all cases where there is a possibility of head injury, the nurse should watch for the escape of blood or clear fluid (cerebro-spinal) from the ears.

The Alimentary System—

The Mouth.—The presence of "sordes" upon the lips, teeth, and tongue should be noted. They are brown or black crusts, made up of dead epithelium, the remains of food, and various fungi, which form in con-

sequence of the absence of the usual movements of mastication, by means of which the mouth in health is kept clean. Sponginess of the gums, and any tenderness or looseness of the teeth, should be carefully watched for when the patient is taking mercury, as they point strongly to the necessity of stopping the drug. Excessive secretion of saliva also goes to show that the patient is fully under its influence. Ulceration of the gums is an occasional complication of scarlet fever

The Tongue. — The nurse should notice, when a patient puts out his tongue, whether it is protruded in a straight line; if not, to which side it is inclined; also, whether it is tremulous. She should also note whether it is clean or furred, dry or moist, and whether any ulcers are present on it. The dry furred tongue is most often seen in enteric fever; but it may also be produced by sleeping with the mouth open, the tongue being dried by the air continually passing over it. About the end of the fourth day of scarlet fever we get what is called the "strawberry" tongue, which is produced by a peeling of the tongue. That organ is then left red and raw, with large prominent papillæ, which resemble somewhat the seeds of a ripe strawberry.

Stomach. — Careful note should be taken of the patient's appetite, and of the exact amount of food he consumes in the twenty-four hours. Any difficulty in swallowing, or symptoms of indigestion such as flatulence, tightness of the chest, pain at the pit of the stomach or between the shoulders, or nausea after eating, should be reported, together with their exact relation to food. If the patient vomits, the

quantity brought up should be measured, so that a true estimate may be formed of the amount of food thus lost. The first vomit should be covered over and kept for the doctor's inspection, as should also any subsequent matters that are rejected, if they seem to the nurse unusual in appearance. Vomited blood may have come from the throat after removal of the tonsils, or from the nose, as the result of epistaxis; or it may have come from the stomach, being due to the bursting of a blood-vessel within that organ, as the result of chronic liver disease in a drunkard, or to the eating through of an artery by a gastric ulcer. In this latter case it is imperative that the stomach be kept empty. When blood has been retained for some time in the cavity of the stomach, it becomes partially digested, and then resembles coffee-grounds in appearance.

Intestines.—Marked abdominal distension, especially when occurring in enteric fever or suspected intestinal obstruction, is a grave and important symptom. Careful note should be made of any pain in the abdomen, its character and duration, together with its effect upon the general condition of the patient.

Stools.—The points to be noticed are their shape, colour, consistency, and amount; whether they contain blood, mucus, pus, or undigested food; the frequency of the motions, and whether there is any pain in passing them. Blood in the stools may be the result of piles, or of ulceration in some part of the large or small intestine. A "tarry" stool is one which contains blood that has been acted upon by the gastric juice. That blood has, therefore, been in the stomach, or has come from the uppermost part

of the small intestine. Iron and bismuth, when taken internally, blacken the stools. Anything unusual should be preserved and shown to the physician. This should always be done with the first stool of an enteric fever patient. Clay-coloured motions are passed when, owing to some obstruction, bile is unable to get from the liver into the intestine. When the calibre of the rectum is much narrowed by a cancerous growth or a simple stricture, the stools are necessarily smaller, and in shape like a ribbon or a pipe-stem.

Circulatory System.—A nurse should note any complaint of palpitation or of pain in the region of the heart. The former is frequently a symptom of no importance, being readily caused by anæmia, excitement, dyspepsia, and hysteria. The latter, if associated with heart disease, is of very grave import. Any tendency to faintness should be noticed. Like palpitation, it is much more common in people with healthy hearts than with diseased. It should, however, always be reported, as it may indicate a dangerous degree of prostration. Pulsating tumours should be noticed, and any swelling of the feet from dropsy. The pulse will be described in the next chapter.

Respiratory System.—The points to be observed are the frequency of the respirations, whether they are noisy or quiet, shallow or deep, difficult or easy, regular or irregular in time and force. Irregular respiration is one of the first symptoms of tubercular meningitis, and therefore of much importance when the presence of that disease is suspected.

A nurse should never let the patient know when

she is counting his respirations, otherwise he will unintentionally alter their frequency. After counting the pulse she should, without moving her fingers from the wrist, quietly observe and take note of the movements of the chest.

Dyspnœa, or difficulty in breathing, is a symptom that may be present in several diseases. It varies very much in character, as well as in severity and duration. A nurse, when reporting an attack of dyspnœa, should be able to describe its mode of onset, how long it lasted, and the patient's behaviour during its presence. The two great causes of dyspnœa are heart disease and obstruction in some part of the air-passages.

In bad cases of heart disease, where that organ is much dilated, and hence too weak to do its work, dyspnœa is often continuous and very distressing. Such patients will sit bolt upright in bed for many hours at a stretch, with blue lips and heaving chests, vainly trying to get enough air into their lungs, and slowly dying one of the most painful of deaths. They cannot bear to be spoken to or to have any one near them: their one desire is air. As a rule, they are more comfortable sitting up in a chair, or if they are strong enough, kneeling in an arm-chair with their arms hanging over the back of it. This posture brings them most relief, because it allows the abdominal viscera to sink downwards, and thus gives freer play to the heart and lungs.

In inflammation of the larynx, such as is met with in diphtheria, inspiration is long and whistling or crowing in character; and, if the obstruction is severe, there is, at the same time, a sinking in of

certain parts of the chest wall. It is a symptom that should be at once reported.

In acute bronchitis respiration is laboured, and accompanied by wheezing and cooing sounds, the patient having to be propped up in bed.

In acute pneumonia, unless the accompanying pleurisy makes breathing painful, there is no dyspnœa. The respirations are much increased in frequency, but there is no obstruction to the entrance of air into the working part of the lungs.

In asthma the dyspnœa is most intense and alarming, though a fatal termination is very rare. An attack usually comes on at night, and lasts a variable time. While it is present the patient sits upright in a chair, gripping some support firmly with both hands, so that he may throw more power into the muscles of inspiration. Expiration is very prolonged and wheezing.

In inflammation of the kidneys dyspnœa sometimes appears. It is an extremely grave symptom; cases which show it almost always terminate fatally.

Sighing respiration, in which long deep breaths are taken without dyspnœa or panting, appears in some cases of diabetes a short time before death. In that disease it has received the name of "air hunger." Sighing respiration also accompanies the heart paralysis of diphtheria, and is a symptom of severe hæmorrhage. If, therefore, the nurse is in charge of a case of enteric fever, or of a surgical case that has been recently operated upon, she should, on hearing this form of breathing, pay most careful attention to the pulse and general condition of the patient, with a view to determining the presence or absence of other symptoms of hæmorrhage.

Stertorous breathing is characterised by a loud snoring inspiration. It is commonly present in patients who are comatose.

Cheyne-Stokes breathing is a very extraordinary form of respiration, which sometimes shows itself in patients who are unconscious as the result of brain disease. As a rule, it appears shortly before death, though very occasionally recovery takes place. Very rarely it is present in other diseases, and has not then quite the fatal significance that it has in cerebral cases. It is characterised by a gradual deepening and quickening of the respirations; after reaching a certain pitch of intensity they gradually subside, until at last respiration ceases altogether. After a pause, lasting several seconds, breathing recommences, and again goes through the same gradual rise and fall.

Cough.—The points which a nurse should notice about a cough are its frequency, duration, whether it exhausts the patient, whether it is more marked during one period of the twenty-four hours than another, and its character. This latter feature varies very much in different diseases.

In pneumonia and pleurisy the cough is short and restrained, because it hurts the patient to cough; in laryngeal obstruction it may be hoarse, or loud and ringing; in hysteria it is barking; in whooping-cough a series of rapid short coughs is followed in most cases by the whoop, though this is not always present; in early phthisis we hear a slight hacking cough. A cough is characterised as "tight" or "loose" according to the absence or presence of expectoration.

Expectoration varies in character in different diseases, and also at different times in the same disease.

If there is lung disease of an acute nature, a specimen of expectoration should be kept each day for the physician, and, if it seems to be excessive, the quantity in each twenty-four hours should be measured. Its appearance should be carefully observed by the nurse. In acute bronchitis it is at first white, frothy, and stringy; later on it becomes yellow and opaque. In acute pneumonia it is very tenacious and of a rusty or plum colour, owing to the presence of blood-colouring matter in it. If there is gangrene of the lung, the sputum is abundant, purulent, and very offensive. In phthisis it is purulent. Children, as a rule, do not expectorate, but swallow the sputum. This the nurse should endeavour to prevent.

Hæmoptysis, or the spitting of blood, when occurring in any quantity, is almost always due to phthisis. In this disease the lung is gradually eaten away into cavities. During this process an artery may be opened before it is plugged with clot, and commence to bleed. The blood gets into the trachea and is coughed up.

Nervous System. — Under this heading come several points to which a nurse should pay careful attention.

Convulsions.—A nurse should always endeavour to find out whether convulsions begin in one part—*e.g.*, the side of the face or the hand—and spread from thence to the rest of the body. The duration and severity of the attack should also be taken note of. They are liable to occur in brain and kidney disease, epilepsy, and at the moment of death in almost any ailment.

Coma is a condition of complete unconsciousness.

Should it attack a patient while under the nurse's observation, she should note whether the onset is sudden or gradual, and if the latter, the length of time that elapses before complete unconsciousness supervenes.

Delirium.—Is it of the low muttering type, as in advanced enteric, or active and noisy, as in the early stage of acute pneumonia? Is it more pronounced at one part of the twenty-four hours than another?

Paralysis.—A nurse should note at once the exact degree and extent of the paralysis, so that she may be able to report any subsequent increase or decrease to the medical attendant. If it comes on while she has the patient under observation, she should note the manner of onset—*i.e.*, whether the paralysis is suddenly or gradually established. Also she should notice whether it varies at any time in the twenty-four hours—*e.g.*, whether a patient who could not move the legs at all when the doctor was present in the morning draws them up slightly in the afternoon.

Loss of Speech.—Is there absolute loss of speech; is speech limited to "yes" and "no," or has the patient a limited command of speech, but uses the wrong words? Any of these conditions may accompany paralysis of the right half of the body.

Sleeplessness may be caused by a variety of conditions. A nurse should take care that it is not due to cold feet, too few or too many bedclothes, the want of a warm drink, or to a light shining in the patient's face. It may also be due to pain or mental worry, both of which the nurse should do her best to relieve. A nurse should always note the exact number of hours

that her patient sleeps, whether his rest is disturbed by dreams, and whether his mind wanders.

Tremor of the hands and tongue, apart from disease of the nervous system, is a symptom of prostration, and is common in the later stages of enteric fever.

Rigor is an important symptom of which the nurse should take careful note and never fail to report. Rigors vary much in intensity and duration. There may be only a slight attack of shivering which quickly passes away, or there may be most severe and general shaking, with chattering of the teeth, lasting for several minutes. While the patient is in a rigor, the face and tips of the fingers are blue, the pulse small and hard, and the expression one of great discomfort. The temperature is raised, and the patient may vomit. Rigors are very important, since they may either mark the commencement of an illness such as acute pneumonia, or they may be the first indication of a serious complication, such as perforation of the intestine in enteric fever. A nurse should note the duration and severity of the rigor, the condition of the patient while in it, and his temperature both during and after the attack.

Genito-Urinary System.—In female patients a nurse should make herself acquainted with the regularity or irregularity of the menstrual function, presence or absence of any discharge, and whether the patient is pregnant.

Any pain or difficulty in passing urine, suppression, or incontinence, must be noted and reported.

Examination of the urine will be considered in the following chapter.

CHAPTER VI.

OBSERVATION OF THE PATIENT—*continued.*

THE PULSE.

THE pulse is one of our most important guides with regard to the patient's condition. Often it is the only indication we have of improvement or the reverse. It is therefore highly essential that a nurse should, to a certain extent, be able to correctly interpret such information as is afforded by the pulse, otherwise she may, especially at night-time, overlook a change for the worse in a patient. This is a most difficult task, which can only be satisfactorily accomplished after long and painstaking practice. There are, of course, many points in connection with pulses which it is quite unnecessary for a nurse to attempt to learn. Practically, all that she needs is a sufficient knowledge of the pulse to be able to tell by it whether her patient is gaining or losing strength. She must, in other words, be acquainted with the meaning of certain changes which may take place in a pulse. To do this, she must constantly and carefully feel her patients' pulses, and when she hears one of them

described as having a particular form of pulse, she should repeatedly examine it until she feels satisfied that she recognises its peculiar features. Frequent comparison with a normal pulse is the surest way to accomplish this. A nurse must always carefully watch the effect of stimulants upon the pulse.

Before it is possible for her to understand the pulse in disease, a nurse must have a thorough knowledge of its characters in health; its rate, varying from 72 per minute in the adult male to about 120 per minute in very young children; its size, and the ease with which it may be stopped by pressure. When examining a pulse the nurse should place two, or better still, three fingers upon the artery, the radial at the wrist being the one generally chosen. This refers to adults; in children one often has to be satisfied with one finger. The pulse should be counted for half a minute. If, owing to its extreme irregularity or smallness, a nurse is unable to count the pulse at the wrist, she should place her hand on the chest a little below and internal to the left nipple and count the beats of the heart. She should always endeavour to take the pulse of a sleeping patient without waking him. This may often be done by placing the finger upon the temporal artery just in front of the ear. Care should be taken, when feeling the pulse, that the elbow is not bent, since that hinders the flow of blood through the brachial artery, and so makes the pulse at the wrist appear smaller than it really is.

In examining the pulse a nurse should take note of its frequency, size, compressibility, and regularity. She must remember that it is slightly quicker by day

than by night, and decidedly more in the sitting up than in the lying down position.

(1) **Frequency.**—Is it a quick or a slow pulse? To be strictly accurate, one should say, Is it a "frequent" or an "infrequent" pulse? "Quick" and "slow" are, however, the terms that are still in common use, and therefore likely to be heard by nurses.

A quick pulse occurs with a high temperature, in conditions of great weakness, &c. Its rapidity varies greatly in different fevers. It is much quicker, for instance, in scarlet fever than in typhoid. A pulse that, with a stationary or falling temperature, gets quicker day by day is the surest indication of a failing heart.

A slow pulse is most often found when a poison, such as bile, is circulating in the blood. It is sometimes the first symptom of commencing heart paralysis in diphtheria, and is not uncommon in old people with feeble hearts.

A running pulse is one that is so frequent, and at the same time so small, that it cannot be counted. The beats follow one another so quickly that there is no appreciable interval between them: all that the finger seems to feel is a kind of tremor in the artery. It occurs, for the most part, in those who are moribund.

(2) **Size.**—Under this heading we have to consider the size of the vessel as well as the size of its beats.

A large pulse is one that feels larger than normal to the finger, and is the usual accompaniment of febrile conditions.

A small pulse is one that feels smaller than normal to the finger. It is a sign of heart weakness, since it

shows that that organ is not keeping the arteries as full of blood as it should. It must not be forgotten that some people in good health have small pulses, and that the small pulse of kidney disease is due to quite a different cause.

A thready pulse is an extreme form of the small pulse, and a sign of great and dangerous prostration.

(3) **Compressibility.**—Is it a hard or a soft pulse? that is to say, does one have to press firmly or lightly on it to stop its beating?

A hard pulse is caused by inflammation of the kidneys, and, to a less extent, by gout. When it is present, there is said to be a condition of "high arterial tension" or tightness, since the arteries are tightly distended with blood. For this reason the size of the beats is small. Firm pressure with the fingers is required to stop its beating.

A soft pulse is also called the "compressible" pulse, since its pulsation is too easily stopped by light pressure with the fingers. It is a sign of heart weakness, since it shows that the heart is not sufficiently distending the arteries with blood.

A dicrotic pulse is a variety of the soft pulse, and occurs most frequently in the late stages of enteric fever. Each beat is followed by a smaller secondary beat, hence the name, since "dicrotic" signifies "two strokes." For every beat of the heart one feels a large and a small beat at the wrist. These two beats of course only count as one, but sometimes they are so nearly equal in size that nurses have been known in counting such pulses to put them down at double their real frequency. Should there be any doubt, the point can easily be settled by counting the beats

of the heart. The dicrotic, like the soft pulse, is due to imperfect filling of the arteries with blood. It is not necessarily a dangerous symptom.

An Irregular Pulse.—A pulse may be irregular in—

(*a*) *Force.*—The beats vary in strength, strong beats being followed by weak beats, and *vice versâ*.

(*b*) *Rhythm.*—There is not always the same interval between the beats. The pulse goes quickly, then slowly, and then quickly again.

This is a serious condition, which is most often found in disease of the mitral valves of the heart; also in severe diphtheria. It is, with irregular respiration, one of the earliest symptoms of tubercular meningitis.

An Intermittent Pulse is one which occasionally drops a beat. It is not necessarily a dangerous symptom, being not infrequently due to dyspepsia or excessive smoking. It must not be confounded with the irregular pulse, which is a much more serious condition. The two are, however, often combined.

In conclusion, what nurses have especially to note is the rate of the pulse and its size, remembering that the quicker, the smaller, and the softer the pulse, the greater the cardiac weakness, and, consequently, the more dangerous the condition of the patient.

Temperature.

1. In Health.—The temperature of an adult in good health should be about 98·4° F. This is called the "normal" temperature of the human body. It does not, however, remain at that point throughout the

twenty-four hours, but rises slightly towards evening, reaching its highest point (99°) between 4 and 6 P.M. During the night it slowly falls, until between 2 and 4 A.M. it has reached its lowest point, viz., 97·5°. There is, therefore, each day a steady and regular fluctuation between 97·5° and 99°. These two points are taken as the limits for health, *i.e.*, a temperature above 99° or below 97·5° is usually indicative of some disturbance of the system. This daily rise and fall are also present in disease. In enteric fever, for instance, the temperature at 2 A.M. is always lower than that taken at 6 P.M., there being often as much as 2° or 3° difference between the two readings. This is merely an exaggeration of the normal rise and fall which in health takes place at these hours. In rare cases we have what is called the "inverse" type of temperature, *i.e.*, it is highest at 2 A.M. and lowest at 6 P.M. This is very uncommon.

Further, not only does the temperature vary with the time of day, but it also varies slightly with the part of the body where it is taken. The surface of the body is naturally cooler than the interior, since heat is constantly escaping from it. The temperature, therefore, of the armpit and groin is lower than that of the mouth, which, again, is lower than that of the rectum. The difference is not great, the bowel being barely 1° hotter than the skin.

2. **In Disease.**—In disease the temperature of the body may be above or below normal, the former being much the more common.

(*a*) *Elevation of Temperature.* — Anybody whose temperature is higher than the normal is said to be suffering from pyrexia. Fever is by many people

used in the same sense, though others mean by it both the pyrexia and the accompanying constitutional disturbance. If the temperature does not rise above 102°, the patient is said to be suffering from moderate pyrexia; if it reaches 104° or 105°, there is said to be severe pyrexia; while if it reaches 106°, the condition is designated as hyperpyrexia, or excessive pyrexia, and is one of great danger. By some 105° is con-

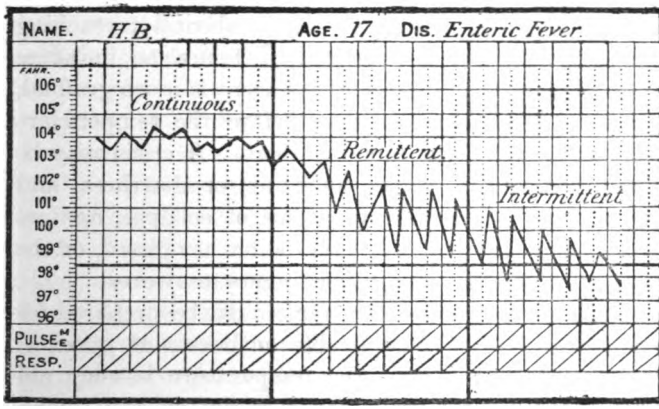

Fig. 1.—*Temperature Chart.*

sidered hyperpyrexial. To put it in other words, 102° is a moderate degree of fever, 104° a high temperature, and 106° hyperpyrexia.

Pyrexia varies in character; it may be either continuous, remittent, or intermittent.

A continuous fever is one in which the temperature keeps constantly at about the same level—*e.g.*, acute pneumonia.

A remittent fever is one in which there is a marked

difference in height between the evening and morning temperatures, the latter falling 2°, 3°, or 4°, but not reaching normal—*e.g.*, enteric fever.

An intermittent fever is one in which the morning fall reaches or passes below the normal line, *i.e.*, at some part of the day there is a complete absence of fever—*e.g.*, malaria—and during the last three or four days of the acute stage of enteric fever.

Fever terminates either by *crisis* or by *lysis*. If the former, the temperature falls abruptly, reaching normal in twelve to twenty-four hours, as in acute pneumonia. If the latter, the descent is more gradual, three or four days elapsing before the temperature reaches normal and remains there. A crisis may be accompanied by profuse sweating or diarrhœa, and sometimes by marked symptoms of collapse, against which a nurse should always be on her guard, or the patient may slip through her fingers unawares.

During convalescence a nurse must be prepared for sudden and often inexplicable outbursts of pyrexia; for during that period the temperature is very unstable, trifling causes, such as worry or excitement, being often sufficient to make it rise 2° or 3° above the normal. This is especially frequent in enteric, though a careful watch must of course be kept for any complication. Such pyrexias are usually of short duration, and unaccompanied by any symptoms of ill-being. They should always be reported.

(*b*) *Depression of Temperature.*—A temperature that is below 97·5° is called sub-normal. When it reaches 95° there is a risk of collapse, though this is by no means a necessary accompaniment, as such a temperature is occasionally seen without any symptoms of

prostration. Sub-normal temperatures are most commonly seen in those who are convalescing from one of the specific fevers, such as diphtheria or typhoid. They are partly due to the fact that the temperature, having fallen below normal as the pyrexia subsided, does not at once recover itself; and partly to the insufficient quantity of heat-producing food that has been taken during the illness.

A sub-normal temperature may also be produced by shock or hæmorrhage. It is then a much more serious condition, and if one as low as 95° be registered, a fatal result will probably ensue.

Taking the Temperature.—This is done by means of an instrument called a clinical thermometer. Those used in this country register the temperature according to the Fahrenheit scale. It follows from what has been said that the temperature should always be taken at the same time each day, and in the same place. If the axilla is used one day and the mouth the next, misleading results are likely to be obtained. Having seen that the thermometer is clean, and having carefully shaken the column of mercury down to at least 2° below normal, the nurse may proceed to take the patient's temperature in the axilla, groin, mouth, or rectum.

1. *In the Axilla or Groin.*—When either of these parts is used, it must not have been exposed for washing or dressing for at least half an hour previous to the temperature being taken. Any perspiration having been wiped away, the bulb of the thermometer is carefully placed in position, and the arm brought across the chest and kept there, the patient supporting the elbow with his other hand. If he is too

weak, the nurse must support the arm. If the groin is used, the legs should be crossed at the knees.

Five minutes is long enough to register the temperature, though a very slight rise may be noticed if the thermometer is left for another five minutes. Instruments are also sold which are said to take the temperature correctly in one minute, and others in half a minute. To be quite safe, they should be left in for at least double those times.

2. *In the Mouth.* — The bulb of the thermometer must be placed *under* the tongue, and the patient told to keep his lips closed until it is taken out again, which should be in three minutes' time. If the lips are not kept closed, cold air will enter, and a too low temperature be the result; this method must therefore be used only in the case of patients who can breathe comfortably through the nose. For the same reason, neither ice nor cold drinks should be given for ten minutes before the thermometer is used. If the lips are dry, they must be moistened, or the patient will not be able to keep them properly closed. This method must never be used with children or delirious patients, as they may possibly bite the thermometer in half; nor is it reliable with those suffering from great prostration, as they are too weak to keep the mouth closed for three minutes.

In the Rectum.—This is the most reliable method. The rectum must be empty of fæces, the instrument oiled, introduced for 1½ inches, and left in position for three minutes.

A nurse should not allow the patient to place the thermometer in position, nor to remove it, else she cannot be sure that the temperature has been properly

taken. The thermometer should be dipped in a *cold* antiseptic solution, and *lightly* dried before being used for another patient. This is especially necessary when taking temperatures in the mouth. If the bulb of the instrument is rubbed roughly when drying it, the mercury will begin to rise.

The temperature should always at once be taken a second time when an unexpectedly high or low record is obtained, in case a faulty instrument has been used. Also, it should be taken again in half an hour, to see if it is still rising or falling. Not to do so, shows either a lack of interest in the case, or a want of the true nursing instinct.

Hysterical patients and malingerers sometimes produce extraordinarily high temperatures by rubbing the bulb of the thermometer. If the nurse has any reason to suspect that such a thing is being done, she should *hold* the instrument in position herself. In that way alone can she be certain that fraud is not being practised.

The Urine.

A healthy adult will pass on an average about 2½ pints of urine in the twenty-four hours. The amount varies with the temperature of the surrounding air, and consequent increased or diminished activity of the skin. There is a certain quantity of water to be removed from the system each day. If the skin uses much of it in the making of sweat, there will be less for the kidneys. When much fluid is taken, more urine will be passed.

Urine is an excretion of great importance, since dissolved in the water are certain poisonous sub-

stances produced by the working of the different organs, which, if left in the system, would quickly kill the patient. In health, urine is clear when passed, of a light amber colour, slightly acid, which may change to faintly alkaline after a meal, with a specific gravity varying between 1015 and 1020. (The specific gravity of a fluid is its weight as compared with that of water. When we say that urine has a specific gravity of 1015, we mean that whereas a certain quantity of water weighs 1000 grains, an equal quantity of urine would weigh 1015 grains.)

In disease, there may be great changes in the character of the urine. The quantity passed may rise to 20 pints per day, or be only a few drachms; the colour may be almost quite black, or it may look like water; the specific gravity may be as low as 1002 or as high as 1060, and the reaction may be strongly and persistently alkaline.

Suppression of Urine is a most serious and frequently fatal symptom. It results from a complete failure on the part of the kidneys to do their work. The patient passes no urine at all, the bladder being quite empty. The poisonous waste substances which should have been removed by the renal organs accumulate in the system, and quickly produce a most dangerous form of blood-poisoning called *uræmia*. Suppression of urine is most common in acute inflammation of the kidneys. It is also seen during the last hours of life in severe diphtheria and cholera.

More often there is a partial suppression, a few drachms or an ounce or two of high-coloured urine being passed in the twenty-four hours.

Suppression may also result from blocking of the

ureters by stones, so that no urine can pass from the kidneys to the bladder. Such cases do not present the symptoms of uræmia, which so frequently appear when suppression is caused by inflammation of the kidneys.

Retention of Urine is much less serious than suppression. Urine is being secreted by the kidneys, but, owing to the patient's inability to void it, is accumulating in the bladder, which may in consequence be greatly distended.

Retention may be due to paralysis of the bladder, or it may be caused by a dulling of the senses, so that the patient does not feel the desire to pass water. This is seen in cases of typhoid, and as a result of shock after severe accidents; or it may be merely the result of nervousness in a new patient. It is a condition for which nurses should always watch, especially in fever patients, and at once report.

Incontinence of Urine.—In this condition there is inability to retain the urine within the bladder. There may be complete incontinence, as is seen in cases of disease of the spinal cord; or there may be incontinence with retention, the bladder being extremely distended with an occasional escape of urine; or there may be the incontinence of childhood, due to irritability of the bladder, worms, or faulty education of the child.

Measuring Urine.—In certain conditions, such as inflammation of the kidneys, or when less urine than normal is being passed, as may happen in diphtheria, the nurse is required to measure the total amount voided during the twenty-four hours, and record the same. To ensure obtaining all that is

excreted during that time and no more, she should make the patient empty his bladder immediately before she starts measuring, because the urine that is then in the bladder belongs to the preceding twenty-four hours. For the same reason, when the twenty-four hours come to an end she should again make him empty his bladder, and add the urine then passed to what she has collected. If during the day any is lost through the patient passing it into the bed, the nurse should put the sign + after the number of ounces she records, as indicating that the patient has passed more than that amount.

Both the vessels into which urine is passed, and also those in which specimens are put up for examination by testing, must be kept scrupulously clean, and absolutely free from any trace of stale urine; otherwise, the next specimens they contain may be spoilt by contamination.

If soda is used to cleanse the vessels, they must be thoroughly rinsed with water afterwards, or the next urine that is placed in them will be rendered alkaline.

Examination of the Urine. — Anything like a complete examination of the urine could never form part of nurses' work, but they are often asked to test it for albumen or sugar. They should therefore have some slight knowledge of this subject. Such knowledge can only be gained by practical demonstration.

Colour varies to a certain extent with the quantity passed: the more concentrated the urine, the higher its colour. Smoky urine indicates the presence of blood, which is also shown by the chocolate-coloured deposit which settles on standing. It is present in acute inflammation of the kidneys.

Dark olive-green urine is caused by the absorption of carbolic acid. It is not infrequently caused by the use of carbolic acid fomentations in young children, and should be at once reported. It must not be confounded with smoky urine, which at first sight it closely resembles.

Porter-coloured urine is due to the presence in it of a large quantity of the colouring matter of the blood. It occurs in "bleeders," a rare and peculiar class of individuals who, as the result of the smallest scratch, suffer from severe and sometimes fatal hæmorrhage.

Bile gives to urine a deep yellow-ochre tinge, a somewhat similar colour being produced by the internal administration of rhubarb.

Deposit.—A nurse should always notice whether the urine is clear when passed, and only becomes turbid on standing. A light-pink or salmon-coloured deposit has no evil significance. It consists of urates, is the usual accompaniment of a high temperature, and is of frequent occurrence in people who are in perfect health. It appears when the urine has become cold, and disappears if it is heated.

Blood gives rise to the chocolate-coloured sediment already mentioned.

Pus produces a milk-white deposit at the bottom of the specimen-glass.

Mucus produces a light flocculent deposit or cloud. It is frequently present in health.

Reaction of Urine.—In health, urine is acid for the greater part of the twenty-four hours—*i.e.*, it turns blue litmus-paper red. For a short time after meals it may be slightly alkaline, the change being due to certain elements in the food. Urine may change

slightly the colour of both red and blue litmus, or it may be neutral in reaction and hence affect neither.

In some fevers urine is rather more strongly acid than usual, but the only important change in disease is a marked alkaline reaction, accompanied by an offensive ammoniacal odour. This indicates decomposition of the urine in the bladder. It is most common in paralysis of that organ from spinal disease, and is not infrequently due to the use of an imperfectly cleansed catheter. If not quickly checked, it will set up cystitis—*i.e.*, inflammation of the bladder.

Albumen is what a nurse is most often asked to test for. It is very frequently a symptom of inflammation of the kidneys, but is also present in the urine in various other conditions, such as heart disease and extreme anæmia, also when the working of the kidneys is disturbed by a high temperature. Various tests are used for albumen, but they all depend upon the fact that that substance is coagulated by heat or strong acids, and then appears as a cloud in the fluid which contains it. An example of this is seen in the case of white of egg, which consists of pure albumen. Boiling coagulates it, converting it from a transparent liquid into an opaque white solid.

In examining a urine for albumen, the nurse should proceed as follows:—

If it is expected of her, she first determines the specific gravity of the specimen by means of a urinometer. She next tests it with litmus-paper to see whether it is acid or alkaline.

In order that one may see clearly any cloud that forms in the process of testing for albumen, it is essential that the urine should, to start with, be quite clear. In many cases it is so; in others the cloudiness is due

to urates, which disappear entirely when the fluid is gently warmed. Sometimes, however, the urine is opaque, owing to the presence of mucus. The only way to get rid of this is to strain the urine through a filter-paper fitted into a small glass funnel. The fluid which passes through will be quite clear. Having now obtained a perfectly clear urine, the nurse proceeds to test it for albumen. This she is usually expected to do in one of the three following ways:—

1. *Heat and Acetic Acid.*—A perfectly clean test-tube is filled three parts full of urine. If the fluid is alkaline or neutral, two drops of dilute acetic acid are added to it. Occasionally a faint cloud will now appear, which the nurse should always look for and report, as it persists on boiling and is not due to albumen, which might therefore be wrongly reported as present. To avoid this difficulty, acetic acid should not be added before boiling if the urine is already acid —that is, if it turns blue litmus-paper red. The uppermost part of the column of urine is then held in the flame of a spirit-lamp till it boils. While doing this, the test-tube is held by the lower end in a slanting direction over the flame, with the other end pointing away from the nurse, so that if the urine should spurt out of the tube when it boils, she may not be scalded. While heating it, she should move the test-tube round and round, so that the sides may be kept wet, or they will be cracked by the heat.

If a cloud appears on boiling, a few drops of acetic acid are added. Should the cloud persist, it is formed by albumen; if the acid causes it to disappear, it consists of salts called phosphates.

By only boiling the upper part of the fluid, one is able to compare the cloudy portion with the clear un-

boiled part below. This is often of great use in determining whether a small quantity of albumen is present or not.

2. *Nitric Acid.*—A small quantity of strong nitric acid is placed in a test-tube, which is then held slantwise while the urine is allowed to trickle slowly down the side. Being lighter than the acid, it floats on it. If albumen is present in the urine, a white ring will appear at the point where the two fluids meet.

3. *Picric Acid.*—The test-tube is filled one-third full of urine and as much picric acid added. If albumen is present, a cloud forms which persists after heating with a spirit-lamp. This should always be done, as with picric acid a cloud is sometimes obtained, disappearing on heating, which is therefore not albumen. The picric acid may also be floated on the urine just as the latter was on the nitric acid. In albuminuria a ring appears at the junction of the two fluids. This is a most useful method of detecting a very faint trace of albumen, the ring so formed being much more obvious than a very slight general opacity. Picric acid, however, like acetic acid, forms with some urines a cloud which is not due to albumen, and which persists on boiling.

Sugar is present in the disease known as diabetes mellitus. The easiest and most reliable test for its presence in urine is to take about a teaspoonful of Fehling's solution (which contains sulphate of copper, caustic soda, and tartrate of potash), boil it in a test-tube, and then add very gradually an equal bulk of urine. An orange-red deposit, which persists on boiling, indicates the presence of sugar.

CHAPTER VII.

DIET IN DISEASE.

In this chapter we shall consider first the general principles which guide the physician in dieting his patients, and afterwards the administration of the diet by the nurse. This is such a very important part of her duty that every nurse ought to have a clear idea of those principles, and of the best way in which they may be carried out. Within the limits of one chapter it would obviously be impossible to consider in detail the appropriate diets of the various diseases. What follows will refer generally to the feeding of patients who are, or have been, acutely ill.

Diet in Acute Disease.—In acute disease (by which is meant an acute febrile illness, such as enteric fever, pneumonia, &c.) there are two urgent reasons for giving the patient as nourishing a diet as possible—

1. To keep up his strength.
2. To hinder wasting.

It is in these very cases, however, that we have to be most careful and circumspect in what we give

our patients; for one result of acute disease is a general derangement of the organs of digestion. They become weak and disinclined to work; hence the patient is liable to dyspepsia, and suffers from loss of appetite. This weakness is most marked in the case of the stomach, which after a time becomes so helpless that it practically does no digesting at all: it merely serves as a reservoir in which the food collects before it passes on into the small intestine. It is well, therefore, to remember that extreme muscular prostration in fever connotes a similar condition of the stomach. Under these circumstances that organ must be tenderly dealt with, and its work made as light as possible. While using every endeavour to keep up the patient's strength, we must not overtax his feeble digestion, otherwise it will be upset, and we shall then have done a positive harm to the invalid. This weakness of the organs of digestion varies very much in different patients. Some show no sign of it throughout their illness, while in others it is one of the most troublesome and worrying symptoms.

In feeding our patients we must, therefore, keep the following objects in view:—

1. To check wasting, by giving as much food as is safe and possible.

2. To give nothing that cannot be easily digested and absorbed.

Milk.—There is no doubt that, as a rule, fluid food is more easily digested than solid, and consequently more quickly absorbed. Our staple article of diet in all cases of acute illness is therefore milk. It is what is known as a perfect food, since it contains

all the elements required for the feeding and building up of the tissues. Admirable food though milk is, it sometimes causes severe indigestion; for the acid gastric juice coagulates it, so that it forms small solid particles called curds. These tend to stick together, and in this way frequently form large hard masses, which the patient's feeble stomach is quite incapable of digesting. As a result, he has pain at the pit of the stomach, and perhaps vomits the offending masses of curd. If he does not, they pass into the bowel, where they tend to set up colic and diarrhœa. Ultimately, they may appear, still undigested, in the stools, so that the patient has had all his pain and trouble for nothing.

When a patient suffers from dyspepsia, or passes undigested milk in his motions, we must do what we can to aid digestion. We must prevent, as far as possible, the formation of these hard lumps of curd. The most certain method of achieving this is by partly digesting the milk before it is given to the patient. That part of it which forms curd is by this means so altered, that, when taken into the stomach, it is unable to give rise to the hard masses it previously did. Milk which has been completely digested has, however, such a bitter taste that few people would care to drink it. By allowing the peptonising agent to act upon the milk for not more than half an hour, the bitterness is avoided, while the process of digestion is sufficiently advanced for the patient to complete it without the pain or trouble caused by ordinary milk.

Benger's and Mellin's foods, when added to milk,

also diminish the tendency to curd formation, while at the same time they add to it a certain amount of nourishment.

Diluting milk with barley- or lime-water, one-third of either to two-thirds of milk, helps in some degree to prevent the small atoms of curd sticking to one another, as does also the addition of ten grains of bicarbonate of soda or potash to each pint of milk. Mixing milk with plain water tends to produce the same effect, and thus renders it easier of digestion. For this reason, all patients suffering from a high temperature ought to have their milk diluted. The thirst which naturally accompanies that temperature will lead them to drink quite enough of this diluted milk in the twenty-four hours.

Whey.—When a patient cannot digest milk in any form, whey is sometimes tried for a time. It may be prepared by boiling a pint of milk with two teaspoonsful of lemon-juice, and then straining through muslin, the curd being at the same time broken up with a fork and squeezed, to express all the fluid from it. Whey is more frequently made by bringing a pint of milk to a temperature of 100°, adding to it two teaspoonsful of essence of rennet, and then letting it stand in a warm place till the curd has set. Whey is very easy of digestion, but naturally does not contain much nourishment, since almost all the fat and proteid are left behind in the curd. Whey may be used for the purpose of diluting milk.

Beef-Tea is another fluid that is usually included in the fever patient's dietary. By this time, probably, most nurses are aware that it is not, strictly speaking, a food. It contains practically no nourishment, and

therefore cannot assist in promoting the growth of the tissues. It is, however, most useful for its stimulating properties, as well as for the salts which it contains. Moreover, it is said by some authorities to assist in checking tissue waste.

Peptonised beef-tea, solidified with isinglass and iced, makes a pleasant change.

Eggs are, like milk, a perfect food, though they do not contain anything like the amount of nourishment with which they are popularly credited. Still they are a useful adjunct to the fever patient's diet, and, as such, are frequently ordered. They are always given in the uncooked state, and may be mixed with broth, tea, or milk; or the white of egg alone may be added to the milk. This is very easy of digestion, and, when well mixed with milk, by shaking the two together in a clean bottle, would be taken unnoticed by the patient. If the whites of four to six eggs are given in the twenty-four hours, an appreciable quantity of nourishment is added to the diet. The eggs must, of course, be perfectly fresh.

Meat Juices and Essences.—Various patent preparations of this character are largely used, especially in private practice. The great majority are quite lacking in nourishment. They act in the same way as beef-tea. The nicest way to give a meat essence is to place it on ice and freeze it. After this treatment it is sometimes readily taken by people whom it would otherwise nauseate. The most reliable member of this class is raw meat-juice freshly prepared each day by the nurse herself.

According to Dr Cheadle, this should be made as follows: Finely mince fresh rump-steak (which should

be quite free from fat), add 1 ounce of cold water for every 4 ounces of meat, and, after mixing, let it stand for half an hour. The juice is then expressed, preferably by means of muslin. The resulting fluid is highly nourishing and easy of digestion. It does not keep well, and should therefore be made twice a-day. When given to an adult, this should be either hot or ice-cold, never lukewarm. Meat that is dry should be scraped instead of minced, and the water then added.

Jellies as ordinarily made are in no sense of the word a food. They are, however, pleasant to the palate, and for that reason, if patients like them, are commonly given.

Bread-jelly, though seldom used, is, on the contrary, both digestible and nourishing. It is made as follows: A thick slice of stale bread is soaked in cold water for six hours, to remove any acid or irritating matter. The water is then squeezed out of it, and the pulp gently boiled for two hours. The resulting mixture is then strained, and rubbed through a fine hair-sieve or muslin. The fluid and solid material which passes through sets into a jelly as it becomes cold. A couple of table-spoonsful of this jelly, mixed with milk and slightly sweetened, is usually readily taken and much enjoyed by enteric fever patients. Flavouring the jelly with lemon makes it more palatable, as does also the addition of a little cream to the milk and sugar. It needs making twice daily, as it does not keep long.

Custards, corn-flour, and light milk-puddings are also sometimes allowed to patients suffering from fever.

Alcohol may be given to a fever patient for one of two reasons.

1. *To Assist Digestion.* — When well diluted (*e.g.*, 1 ounce of alcohol to 6 ounces of water), this drug mildly stimulates the mucous membrane of the stomach, and, by increasing the flow of gastric juice, aids digestion. At the same time it cleanses the palate and improves the appetite. To produce these good effects, a small quantity of the diluted alcohol (about an ounce) should be sipped a few minutes before the meal, while the rest should be taken with the food.

2. *To Stimulate the Heart.*—Alcohol effects this by stimulating or irritating the mucous membrane of the stomach, which passes on the stimulation or irritation through the central nervous system to the heart. Ammonia stimulates the heart in a similar manner by irritating the mucous membrane of the nose. It is obvious that the more alcohol is diluted, the less will it stimulate the stomach, and consequently the less will it stimulate the heart.

When, therefore, we wish to stimulate the heart, alcohol should be administered in a much more concentrated form than when it is given to aid digestion. Not more than two parts of water should be added to one of alcohol, and this mixture should be slowly drunk. At the same time, it must be given often, so as to keep up the stimulating effect. If given often, it must be used in small doses, otherwise the patient will be injuriously affected by the quantity. Brandy should not be given in milk, but in water, as it will then have a more decidedly freshening effect upon the palate.

Tea.—If the doctor has no objection, and it does not cause indigestion, a good cup of tea twice in the twenty-four hours will be much appreciated by every fever patient. It is very refreshing, and helps the patient to take his milk. 4 A.M. and 4 P.M. are about the best times to give it.

Water.—Provided it does not interfere with the taking of milk, a patient should be allowed to drink plenty of cold water. Not only is it grateful on account of thirst, but it is needed to replace the loss of water from the system; also to flush the tissues, and thus cleanse them from the waste products which are produced in excessive quantity during a febrile attack.

Ice broken into small pieces is frequently given for the relief of thirst and extreme dryness of the mouth and tongue. It should be used in moderation. When given for nausea or vomiting, it should be swallowed whole, and not allowed to melt in the mouth. To drain away the water, ice should be kept on a piece of flannel tied across the top of a basin. Under these conditions it will last longer.

The Average Fever Diet.—Having passed in review the various articles that may form part of a fever dietary, we must now consider the amount of food that is usually given to one of these patients in the twenty-four hours. Every one is agreed that he must be fed frequently and in small quantities. Not too much must be given at a time, or the weak stomach will be overtaxed; while if little is given, that little must be often, or the patient will fail from want of nourishment. Fortunately, a patient with a high temperature suffers from a chronic thirst, and is therefore always ready for a drink.

For an adult patient a very common allowance is 3 pints of milk in the twenty-four hours. As he will need a drink at least every two hours, this should be divided into twelve feeds of 5 ounces. Each 5 ounces of milk should have about 3 of barley- or lime-water added to it, thus giving the patient a drink of 8 ounces every two hours. If he is ordered to be fed every hour, he would get half this quantity in each feed. When beef-tea forms part of the diet, it should be given in feeds of 5 ounces at a time. The milk should be cold, the beef-tea is usually warm; though, if the patient prefers it cold, there is no objection to it being so given. The above quantities represent a fair average allowance for an adult. Some fever patients will take more, others less. Some will be unable to digest the milk, unless it is still further diluted; others will require it to be partly digested. If they vomit, it must be peptonised, and at first given in smaller quantities. Sometimes even this is rejected, in which case we have to fall back upon whey and veal broth, or even resort to rectal feeding. Home-made koumiss is sometimes very useful in these cases.

The Feeding of the Patient by the Nurse.—The first and most important duty of a nurse is to see that her patients take a sufficient quantity of food in the twenty-four hours. With the majority there is no trouble; but occasionally they are very tiresome, and tax both the nurse's patience and her ingenuity in overcoming their objections to the constantly appearing milk. A nurse must never give in to these objections; but with quiet and gentle persistence must let such patients see that she is determined to have her own way. With the permission of the medical attend-

ant, a little variety may be introduced by occasionally flavouring the milk with tea or coffee, or giving it sometimes in the form of a jelly or as junket. This latter dish, iced, with a little whipped cream spread over it, will usually form a most acceptable change of diet. If the patient's obstinacy proves unsurmountable, the nurse must never fail to acquaint the medical attendant with this state of affairs. Some nurses do not like to do this, thinking such an admission a reflection upon themselves. Did they recognise how serious a matter the loss of food is to their patients, they would not allow themselves to be influenced by such a small consideration.

In connection with this may be mentioned a doubt which sometimes rises in a nurse's mind as to what is the right thing to do. Ought she to wake a patient, who has previously been sleeping badly, in order that he may take his food at the usual time? In such a case the nurse should, if possible, have previously obtained instructions from the doctor as to whether he would like the patient roused for every feed during the night in the event of his sleeping soundly. In the absence of such instruction, a nurse must use her judgment in deciding whether sleep or food is most needed by the patient. If he is being fed hourly, she might certainly give him a double quantity, and thus only wake him every two hours. If he is being fed two hourly, she ought certainly not to allow him to miss more than one feed. A good nurse will often be able to give her patients a drink of milk without fully waking them, so that they drop off to sleep again at once.

A nurse should observe strict punctuality in giving her patients their milk. This is almost always done

out of a feeder holding about 10 ounces, partially covered over at the top, and fitted with a curved spout. Placing a folded towel under the patient's chin, the nurse passes her left arm behind his neck, or, better still, behind the pillow, and thus raises his head a few inches off the bed. Placing the spout between his lips, she gently tilts the feeder up, and allows about half an ounce to run into his mouth. She then withdraws the spout, while the patient swallows the milk. After a few mouthfuls, the nurse removes her arm, and the patient is allowed to rest for a minute or two, since anything like hurry should be carefully avoided. The feeding is then resumed and finished, after which the nurse wipes the patient's mouth, arranges his pillow, and leaves him to sleep. The degree of prostration determines very largely the speed with which a patient is able to drink his milk.

A better method of feeding, both for the patient and the nurse, is to allow the former to suck the milk out of a feeder or a cup by means of a bent glass tube. He can then drink it as slowly as he likes, without being raised from the bed, the nurse merely supporting the feeder. In default of the glass tube, a piece of moderately fine rubber drainage tubing might be used, but the former is in every way preferable. Both tubes would need careful cleansing after use, and the rubber one should be kept in clean water.

For patients who are very weak and helpless, a useful plan is to put a small piece of drainage tubing on to the nozzle of a glass syringe, fill the latter with milk, place the end of the tubing between the patient's lips, and very slowly empty the syringe, giving the patient plenty of time to swallow.

When feeding a patient who is partially unconscious, great care must be taken, otherwise the food may get into the lungs and set up a fatal pneumonia. In such a case, rubbing the spoon or spout of the feeder against the patient's lips will often cause him instinctively to open them, when a small quantity of milk may be safely poured into the mouth. In the same way, a patient who is sleeping soundly can often be roused sufficiently to take a drink without being completely awakened.

Milk should not be left uncovered beside the patient's bed, otherwise it collects dust and germs from the surrounding atmosphere.

No milk that is in the least sour should be used. If it is suspected—and a nurse should always smell and taste it before use—some should be boiled, when the formation of curds will indicate the unwholesome condition of incipient sourness, and lead to its condemnation; for no amount of boiling will render such a milk fit for food.

Alcohol.—The best method of administering this drug as a stimulant has already been described (p. 99). The doctor will say how much is to be given, and will also probably indicate how often. If he does not, the nurse should ask him. Every two hours is a very common time; though, if the patient is very weak, some may be needed every hour. For instance, if ℥iii of brandy are ordered to be given in the twenty-four hours, it may be administered in doses of ℥ii every two hours, or ℥i hourly. It should be drunk slowly, and, for the reason stated on p. 99, not mixed with more than two parts of water. Putting a teaspoonful or two of brandy into a feeder of milk renders

it quite useless as a stimulant. A nurse should, therefore, not give brandy directly after a feed of milk; otherwise the stimulant will be rendered inert by excessive dilution in the stomach.

Diet in Convalescence. — When the fever has come to an end, a gradual return is made to solid food. The speed with which that return is made will depend, in the first place, upon the nature of the patient's illness, and, secondly, upon the condition of his digestive apparatus. One who has had enteric fever will be longer in reaching his minced fowl and mutton chop than one who has had pneumonia. Similarly, a more gradual return will be necessary for the patient who has had dyspepsia than for one who has throughout shown no sign of that complaint.

In feeding a convalescent patient, a nurse may have one of two difficulties to contend with.

(*a*) To get him to take enough.

(*b*) To prevent him taking too much.

The second of these two difficulties most often occurs with the convalescent enteric-fever patient. After a prolonged course of milk, he is naturally afflicted with a ravenous appetite, which he thinks it hard he cannot gratify. In such a case, the nurse must follow strictly the doctor's instructions with regard to the patient's diet, taking care that the latter eats nothing but what has been ordered for him, explaining to him the risks he runs if he disobeys those orders. It is especially on visiting days that a nurse should keep a careful eye on such patients, since they sometimes persuade their friends to bring them food, which, if taken, may be the means of causing a relapse.

To persuade the convalescent to eat, when he does

not want to, is a much more difficult matter. This can best be achieved by making each meal as tempting as possible. With that end in view, the plate should contain only a small quantity of food. A heaped-up mass of meat and vegetables would only create loathing in one of delicate appetite. Let the plate and its contents be hot, and let everything that the patient can want during his meal be got ready before he is invited to commence it.

When the patient has finished, what is left should at once be taken away, even though it be the greater part of the meal. To leave the food beside the patient's bed, with the idea that by-and-by he will perhaps feel inclined to eat a little, is the surest way of preventing him so doing. If he could not eat it when it was fresh and hot, he certainly will not do so when it has become cold and is uninviting to look at.

Alcohol, when given to a convalescent, is used for the purpose of stimulating appetite and aiding digestion. It is therefore best given as recommended earlier in this chapter.

The Private Patient's Diet.—It is when attending upon a fever patient in private that a nurse realises what an immense aid a knowledge of cookery is to the successful practice of her profession. This is especially true of the convalescing stage, when the patient is sufficiently recovered to take an interest in his food, and to object to a sameness of diet. Having obtained the doctor's permission as to the extent to which she may vary the food that is ordered, she should endeavour to present it to her patient in as many different forms as possible, so as to provide a

little variation at each meal. He will then take it more readily and with greater relish.

A patient, for instance, whose principal article of diet is milk might have it varied for him in the following ways. It can be made into a jelly with isinglass, alone, or flavoured with cocoa; or it can be given as junket. A little whipped cream should be spread over each. It can be given with bread jelly, which is very digestible, slightly flavoured with lemon in the making, a little cream and powdered sugar being added to the mixture; or a powdered rusk could be used instead of the bread jelly. It can be flavoured with tea or coffee, made into koumiss, and given at night or in the early morning as wine-whey. A light, well-made custard is usually admissible, and thin milk gruel, peptonised, and sweetened or salted according to the patient's taste, could do no harm. Well-made ice-cream, flavoured with coffee or chocolate, is sometimes very useful. Other methods of preparing milk will occur to most practical nurses. A nurse would, of course, not treat her patient to all of these variations directly he was put on liquid diet, but would wait until he began to tire of his milk, and then begin to gradually introduce them. At the same time he would almost certainly be allowed light broths, such as those made of chicken and veal.

When he has reached the convalescent stage, the nurse must still consult his tastes as much as possible, both with regard to his diet and the hours at which he takes it. She must also be constantly on her guard against doing anything which might set him against his food. Scrupulous cleanliness, and extreme nicety in serving each meal are essential, care being

taken that the patient is not kept waiting, nor disgusted by the sight of a large quantity of food. It is always better to allow him to help himself from a covered dish, when he can take as much or as little as he likes. The nurse should exercise her ingenuity in the production of dainty little dishes that may possibly tempt his appetite. She must never feel discouraged by his rejection of them, but must promptly set her wits to work to think of something else, remembering that it by no means follows because two patients have the same kind of illness they will both like and be suited by the same kind of food. Nothing that the patient is going to eat should be prepared in his apartment. He must know nothing about his next meal, before it is placed in front of him by the nurse. Similarly, if food or stimulant must be kept in the room, they should not be placed beside the patient's bed, but where he can neither see nor smell them. The nurse ought never to talk to her patient while he is eating, nor should she, if it can be helped, be in the room while he is doing so. The remains of the meal must, of course, be taken away at once.

If possible, the nurse should always have her own meals in another room, for watching somebody else eat is apt to engender a loathing for food in one who is troubled with a delicate stomach.

A nurse must never taste the patient's food in his presence—*e.g.*, to see whether the broth or beef-tea is too hot. This should always be done outside, and with a different spoon to that which the patient is going to use. Most people would strongly object to eating with a spoon which had recently been in another person's mouth.

Finally, when reporting to the doctor, whether in hospital or in private, upon the amount of food which the patient has consumed, a nurse must always endeavour to be exact, and give quantities. She should never talk vaguely about the patient having "taken well," because opinions frequently differ as to what constitutes "taking well." In such a matter the doctor does not want to know what the nurse thinks, but what the patient has done.

CHAPTER VIII.

COLD BATHS AND PACKS.

In this and the following chapter it is proposed to deal with the various forms of baths and packs as used in the treatment of disease. Their influence primarily falls upon the skin. A brief consideration of its functions is therefore necessary, before attempting to explain the object and effects of baths and packs.

The Functions of the Skin—

1. *It is the Principal Channel by which Heat escapes from the Body.*—In health the human body remains constantly at about the same temperature. Yet heat is continually being produced by the different muscles and organs of the body. Of these, the muscles are the most important. They supply four-fifths of the total heat of the body. Even when they are at rest this supply does not cease, though it is naturally much augmented when they are actively contracting. To compensate for this continual production of heat in the interior, there must be a correspondingly constant loss at the surface; otherwise the temperature of the body would rise above what is called the "normal" limit for health.

The skin and lungs are the two channels through which this loss takes place. Of these two, the skin is the more important, since about four-fifths of the total loss of heat from the body takes place through it. Heat escapes from the skin—

(*a*) *By Radiation and Conduction.*—When two bodies of unequal temperature are brought in contact with one another, that which is hotter gives up some of its heat to the cooler. The latter conducts heat away from the former. Thus the water of a cold bath conducts heat from the skin. Except in the middle of summer, the surrounding atmosphere is of a lower temperature than our bodies; consequently heat radiates from us into it by way of the skin, in the same way as it does from a fire.

(*b*) *By the Evaporation of Sweat.*—During the evaporation of a fluid, heat is abstracted from the body upon which that fluid is situated, and its temperature is therefore lowered. The more quickly the fluid evaporates, the more quickly is heat abstracted. Thus, ether, which evaporates with extreme rapidity, produces, for that reason, a feeling of intense cold when placed upon the skin.

Embedded in the skin are immense numbers of little glands, called sweat-glands, which open on the surface of the skin by very minute apertures called "pores." From these pores the perspiration is continually escaping. Under ordinary circumstances the quantity escaping at one time is so small that it evaporates before it has time to collect upon the skin in distinct drops. This is called "insensible" perspiration, because it is not evident to the senses. When more sweat is secreted than can be at once evaporated, it

appears on the skin as drops of moisture, and is then called "sensible" perspiration. The quantity secreted in the twenty-four hours varies very much, being dependent upon such external conditions as the temperature of the atmosphere and the amount of exercise taken. Muscular action gives rise to an increased production of heat, yet during and after severe muscular exertion the temperature of the body does not rise. This is accounted for by the fact that the sweat-glands are at the same time excited to increased activity, so that there is a corresponding increase in the loss of heat, owing to the evaporation of sweat. The same thing happens when the temperature of the surrounding atmosphere is higher than that of the body, as is the case, for instance, when a patient is having a hot-air bath. The sweat-glands at once begin to secrete more sweat, and thus prevent the temperature of the body rising.

Thus, by means of evaporation and radiation, a large quantity of heat is abstracted from the blood in the skin, and so the production of heat, which is constantly proceeding in the interior of the body, is counterbalanced.

Dogs have practically no sweat-glands, and their skin, covered as it is with hair, can lose but very little heat by means of radiation. Consequently their surplus heat can only escape in one way—viz., by the lungs. Hence their very rapid respiration in hot weather or after a sharp run, since the more quickly they breathe the more heat they lose.

2. *It is at times one of the Organs of Excretion.*—The kidneys and the lungs are the organs which remove from the system the poisonous waste products

formed during the working of the various parts of the body. Of these two, the kidneys are by far the more important. When, however, they are diseased, the skin, by means of its sweat-glands, becomes for the time an organ of excretion; and, by relieving the kidneys of a portion of their work, plays a most useful part in the removal of waste material from the body. Otherwise, it does practically nothing towards cleansing the system, it being now recognised that the function of the sweat-glands is to promote the escape of heat from the body, and thus to regulate its temperature.

The skin is also slightly absorbent, and is the chief seat of the sense of touch.

Cold Baths, etc.

Until quite recently it was thought that the beneficial effects, which followed upon the use of cold baths in the treatment of fever, were due to the lowering of the temperature. This view is still true for cases of hyperpyrexia, in which the thermometer registers 107°, 108°, or higher. These are medical emergencies, where the temperature must be lowered as speedily as possible, since its continuance at such a height will almost certainly kill the patient. The use of baths, however, in a disease such as typhoid fever, is now believed to do good principally by increasing the destruction and removal from the system of the poison of the disease, and only secondarily by the lowering of the temperature.

Cold water, when applied to the skin, stimulates the internal organs, as is shown by its effect upon the

heart in cases of fainting. Similarly, in typhoid it increases the activity of those glands which are engaged in destroying the poison of the disease, thus leading to a more rapid removal of it from the system. It has been shown that, under the influence of cold baths, the urine of typhoid-fever patients has contained three times as much of the "toxin" or poison of the disease as it did when the baths were not being used. That is to say, the poison was being three times as rapidly removed from the system, which is a matter of great importance when we remember that the patient's illness, with all its symptoms, is entirely due to the presence of this toxin in the circulation.

Another advantage of this method of treatment is that it acts as a sedative to the nervous system. It lessens delirium and induces sleep. Further, it is a stimulant to the heart, and braces up the circulation. At the same time, by lowering the temperature, it tends to diminish wasting.

We may say, then, that cold water, when used externally in the treatment of fever, produces the following beneficial effects:—

(*a*) The removal of toxins from the system is hastened.

(*b*) Pyrexia is diminished.

(*c*) Delirium is lessened.

(*d*) The circulation is improved.

(*e*) Wasting is lessened, and nutrition improved.

Antipyretic drugs—such as antifebrin, antipyrin, &c.—are objected to on the score that, although they lower the temperature, they depress the activity of the different excretory glands, and hence hinder the removal of toxins from the system. Statistics show that cases

treated with baths have a much lower mortality than those treated with antipyretic drugs, which goes far to prove that the former method does something more than merely lower the temperature. We still, however, take the temperature as our chief guide in ordering baths for fever patients. Being caused by the poison of the disease, its height is an indication of the amount of that poison circulating in the system, and therefore of the necessity for bathing.

The systematic use of cold water in the treatment of disease is usually reserved for cases of enteric fever. In other illnesses, as a rule, it is only applied when the temperature is sufficiently high to have an injurious effect upon the patient.

Before giving any sort of bath, a nurse should obtain exact instructions as to the temperature of the bath, and the length of time the patient is to be kept in it. To follow out the former of these two instructions to the letter, she must never be without her bath thermometer.

Cold water may be used in the treatment of fever in one of the following ways :—

1. **Cold Bath.**—This is undoubtedly the most efficacious. At the same time, it is more or less of a shock to the patient, and for that reason is seldom used in this country, except when the immediate lowering of a dangerously high temperature is desired.

A long bath, half full of water at a temperature of about 65°, is placed transversely at the foot of the bed. This position is recommended by Dr Hare as preferable to having the bed and the bath in the same straight line. A small towel is fastened round the patient's hips with a safety-pin, and his night-shirt

taken off. His head and neck are then sponged with cold water, and the bed-clothes afterwards removed. He is now carefully lowered into the bath on a sheet. For systematic bathing, Dr Hare's perforated canvas stretcher on light wooden poles would be much better than a sheet. It fits loosely into the bottom of the bath, the patient being again lifted out on it, and laid on a macintosh. When first placed in the water, the patient gasps for breath, but this gradually passes off. Owing to the contracting effect of the cold water upon the superficial blood-vessels, his pulse becomes smaller. To the uninitiated this might appear a dangerous symptom, whereas it is merely a normal result of the bath. With the gasping respiration there is usually a slight degree of shivering, which soon stops. Later on in the bath shivering may again commence. This must not be taken as an indication for stopping the bath, unless it becomes violent. While in the water, the patient's skin should be subjected to firm yet gentle friction by the nurse's hands.

At the expiration of ten minutes a blanket is thrown across the top of the bath, and the towel removed from the hips. The patient is then lifted out by placing the hands behind him, and leaving the wet sheet in the bath. Still covered by the blanket, he is laid upon another which the nurse has warmed and placed upon his bed. He is now rapidly and gently dried with a warm towel, the two blankets slipped away, a sheet and one blanket thrown over him, and his night-shirt put on. There is no need to heap blankets upon him, or put hot bottles to his feet, unless he remains very cold, or continues to shiver after removal from the bath, in which case a hot drink should first be given

to him. At the same time, a nurse must have these things ready, as well as some brandy and a hypodermic syringe, in case symptoms of collapse should appear. In this country, at any rate, a medical man is usually present when a cold bath is given.

In a private house, where there is no portable bath, the following method may be used:—

The head of the patient's bed is raised about a foot from the ground. A long macintosh, that has been warmed, is spread under him, a sheet thrown over him, and his night-shirt removed. Pillows are placed beneath the macintosh on each side of the patient, and a hip- or foot-bath stood at the bottom of the bed. Water is then poured over the patient at the head of the bed, whence it runs over him down the macintosh trough into the receptacle at the foot.

2. **Tepid Bath gradually cooled.**—This is more pleasant than the cold bath, and, being less of a shock, can be used in cases where the other might prove dangerous. It is always used for children in preference to the cold bath.

The patient is prepared exactly as for the cold bath. The temperature of the water to begin with should be about 90° F. From this point, by the gradual addition of cold water, it is slowly reduced to 70°. While the patient is in the bath, one nurse should be continually adding a little cold, and, when necessary, removing some of the warm water, the while keeping a careful watch on the thermometer. The other nurse should devote her entire attention to the patient. If ice is also being used, it must be broken up into small pieces before the bath is com-

menced, otherwise it will take too long to melt. While the bath is being given, the water must be frequently moved about by the nurse's hand, so as to keep the temperature of the whole as even as possible. The bath thermometer must remain all the time in the water, so that the descent of the mercury may be constantly watched. The patient's body must be rubbed by the nurse while he is in the bath. He should be taken out as soon as his temperature has fallen to 100°. It is seldom necessary or desirable to keep him in longer than twenty to twenty-five minutes, as his temperature will continue to fall for a short time after removal from the bath. It is best taken in the mouth. If, however, the patient is delirious, or if a child and very restless, the thermometer should be placed in the rectum. While in the bath, the patient should be carefully watched for the first symptoms of collapse, and, if these appear, at once removed.

This form of bath is naturally both slower to act and much more trouble to give than the cold bath. It takes a large quantity of ice to produce much effect upon the temperature of a long bath half full of water at 90°. Crushed ice sufficient to fill six pint measures, when added to such a bath and dissolved in it, only reduces the temperature about 4°. With a feverish patient immersed in the water, the effect would be still less. If, on the other hand, cold water is added, before 70° is reached the bath would be much too full. Some of the water must therefore be removed. When the bath is fitted with a tap, its contents are easily drawn off into buckets. If it has no tap, the warm water should be siphoned off into

pails by means of a long piece of drainage tube, while cold water is added to take its place. This is a neater and more rapid method of removing the surplus water than baling it out with jugs or basins.

If the patient is a child, it can be carried to the bathroom, where giving a graduated bath becomes a very simple matter. Very young children should not be kept in the bath longer than ten minutes, nor should the temperature of the water be reduced for them below 80°.

It is of great importance that the chest should not be submerged when cases of inflammation of the lungs are bathed, otherwise the act of respiration is rendered more difficult by the weight of the water. This precaution is especially necessary in the case of young children, because of their more flexible chest-walls. The nurse should support the back of the patient with one hand and sponge the chest with the other.

3. **Cold Pack.**—The bed-clothes are first taken off the patient, and a blanket thrown over him. A large macintosh covered by a blanket is then slipped under him, a small towel fastened round his hips, and his night-shirt removed. Two large sheets are taken, and each folded once lengthways and once crossways, thus making four thicknesses, and then wrung out of cold water (65° F.) One of these is placed under the patient, and the two sides of it brought up to the front of the body between the arms and ribs, and also tucked round the thighs and legs. The other sheet is then laid on the front of the body, tucked round the neck and also beneath the body on each side, passing on the outer side of the arms. It is important that the pack should be closely adapted to the whole of the trunk,

and not separated from it by the arms. This is much easier of attainment with two sheets than with one. The feet are usually left uncovered. If the patient shivers much, a hot bottle may be applied to them. The patient, covered with one blanket, is left in the pack for ten minutes. At the end of that time the sheets are separately removed, again wrung out of cold water, and reapplied. This process is usually repeated at least four times.

Another plan is to combine the cold pack and the cold affusion. The sheets, having been once applied, are kept cold by sprinkling the patient with water from a small watering-pot, or rubbing him with ice. This can be done every three or four minutes, front and back, until the temperature, as taken in the mouth, has fallen to the required point; or the upper sheet can be removed, and, the patient being turned slightly on one side, the inner surface of the under sheet be sprinkled with cold water. This method involves less disturbance of the patient than does the changing of both sheets; at the same time it is less pleasant, since the wetter the sheets are, the greater the discomfort caused by their application.

A partial cold pack can be given by means of towels. The patient having been prepared as before, three towels are wrung out of cold water and applied lengthways, one to the trunk and one to each of the lower extremities. They will, of course, need frequent changing. About every three minutes they should, one at a time, be taken off, wrung out of cold water, and reapplied. This is, naturally, a less efficient method of reducing pyrexia than either of the others. It may, however, be the only one possible in private nursing.

When taken out of a cold pack, the patient is treated in the same way as after a cold bath. Hot bottles and warm drinks are only given if he continues to shiver or remains very cold.

4. **Cold Sponging.** — For performing this small operation a nurse needs—a bath thermometer, a basin of water at a temperature of 65° F., another containing small pieces of ice, a small sponge (one about the size of a large orange is quite big enough), a blanket, and two bath towels or draw-sheets. The blanket is slipped under the patient, his night-dress removed, and the bed-clothes taken off, with the exception of one blanket, which is turned down as far as the hips. The towels or draw-sheets are then tucked closely against each side of him, passing to the neck behind the shoulders, so as to catch the water which runs off him in the process of sponging. The blanket will protect the bed against any which escapes the towels.

The nurse takes her sponge, dips it in the water, squeezes sufficient out of it to prevent it dripping as she moves it from the basin to the patient, and then lightly dabs the body of the latter with it. The sponge should be so wet that each time it touches the patient a few drops of water escape from it. These, as they run off the chest, will be caught in the towels, leaving the bed quite dry at the end of the operation. This is a much more efficacious method than placing the patient under a blanket, and stroking him in sections with an almost dry sponge. The chest and abdomen must be freely exposed during the whole of the sponging, and, by a series of light dabs or taps, kept constantly wet. The operation should last for

at least ten minutes, and, if the patient is standing it well, may, in the absence of directions, be advantageously prolonged to fifteen. It is hardly worth while sponging the limbs; but the back can easily be done, by turning the patient on to his side and re-arranging the towels. If ten minutes have been devoted to the front of the trunk, five will be enough for the back. Sponging the back with cold water stimulates the circulation in the skin, and helps to prevent bed-sores. When the sponging is finished, the patient will be dried by lightly dabbing him with a warm towel. The towels and blanket are then removed, and his night-dress put on. Before the back is sponged, the front of the chest should be dried. During the operation the temperature of the water will be kept at, or a little below, 65° by the addition of ice. Sponging a patient by this method produces the minimum of disturbance with the maximum of effect. That effect, however, is at the best poor compared with the result of the cold or tepid bath, and is much more transitory. It is but seldom that one is able to effect a greater reduction of temperature by sponging than 2½°. Such a reduction is, however, ample, if the cold-water treatment is being regularly used in a case of enteric. The patient's temperature should be taken thirty minutes after the completion of the sponging, as that is the time when it is likely to be at its lowest as the result of this treatment. If taken within ten or fifteen minutes, the thermometer should be placed in the mouth or the rectum.

Instead of using cold water, some physicians order patients who are suffering from high fever to be

sponged with water at a temperature of 110° F. The object of this method is to dilate the vessels in the skin, and so bring a large quantity of blood to the surface of the body, where it will be exposed to the cooling influence of the air.

Tepid sponging is frequently used for checking the profuse night-sweats of early phthisis.

5. **Cradling.**—This is the least efficacious method of reducing a high temperature. It has, however, one great advantage—viz., that it can be used with practically no disturbance of the patient; hence it can be applied in cases where there might be an objection to the employment of any of the methods previously described.

The bed-clothes are taken off, and a blanket folded over the feet and legs as high as the knees. Two large body-cradles are then placed over the patient. These are covered by a sheet which is tucked in at the sides of the bed, but folded back at the foot and top, so that, though the patient is in no way exposed, a free current of air may pass through beneath the cradles. The night-dress is now drawn up. The patient may be left for some hours in this position, till the temperature, which should be taken every hour, has fallen sufficiently. If the temperature shows no signs of coming down, three or four ice-bags may be hung inside the cradles. These must not touch the patient, and should be wrapped in lint to prevent any dripping of water. If the feet become cold, a hot bottle may be applied. If the weather is at all chilly, this form of treatment is attended with considerable discomfort.

The foregoing five methods of reducing pyrexia

have been taken in their order of efficiency. The cold bath is by far the most certain and rapid method of lowering a high temperature, while sponging and cradling take a much lower place. They can, however, be used in cases where, owing to the condition of the patient, the more potent methods are inadmissible. Hence the necessity for their inclusion in this chapter.

CHAPTER IX.

HOT BATHS AND PACKS.

THE application of heat to the surface of the body produces dilatation in the vessels of the skin, and therefore increases largely the quantity of blood which they contain. This extra supply has been drawn from the muscles and internal organs, which consequently contain less blood than they did before heat was applied to the skin. Now, in health, the more blood there is passing through any part of the body, the more food does that part obtain, and therefore the greater is its activity or power of work. Conversely, a diminished supply of blood to a part means less work for that part to do. Hot baths and packs, by drawing blood from the deeper structures to the surface of the body, are therefore useful in the following conditions:—

(*a*) **Inflammation of the Kidneys.**—By diminishing the amount of blood that is passing through the kidneys, hot baths lessen the work of those organs, and therefore give them a better chance of recovery. At the same time, by increasing the blood supply of the skin, they throw more work upon the sweat-

glands—*i.e.*, they increase the flow of perspiration. When the kidneys are inflamed the sweat-glands relieve them of a portion of their work, and remove from the blood certain of those poisonous waste substances which in health should appear in the urine.

(*b*) **Muscular Spasm.**—When the blood supply of a muscle is diminished, its functional activity is at the same time depressed. Hence, if it has previously been contracting so energetically as to cause pain, a hot bath, by withdrawing blood from it, and so causing it to become relaxed, will help to stop such painful contractions. Thus is explained the beneficial effect of a hot bath in those forms of colic which are caused by contractions of the circular muscle in the wall of the intestine. Infantile convulsions are relieved in a similar way.

(*c*) **Insomnia,** apart from such a cause as pain, is due to a too persistent activity of the brain. It will not stop working, and hence the individual to whom it belongs is unable to sleep. A hot bath, by drawing blood from the brain to the surface of the body, lowers the activity of that organ, and conduces to sleep.

(*d*) **Pain.**—Hot baths exert a soothing influence upon the nervous system, and thus diminish pain. They are useful in chronic painful affections of joints, nerves, and muscles, and also in some forms of abdominal pain.

Before giving any of these baths, a nurse should get everything ready that she is likely to want, including brandy and a hypodermic syringe.

1. **Hot Bath.**—The temperature of a hot bath may vary from 100° to 110° F., or even higher. To begin

with, it should not exceed 100°. After the patient has been lifted in, its temperature should be raised very gradually, by the addition of hot water, to the degree ordered. The hot water should be added very slowly at the foot of the bath, and while this is being done the nurse must move the water about with her hand, so as to ensure its being thoroughly mixed; otherwise there is a certain amount of risk that the patient may be scalded, since hot water, being lighter than cold, rises to the top. The temperature of the bath should always be tested by a thermometer, but if, by chance, the nurse is unable to procure one, she had better test the heat of the water with her elbow, as that part is more sensitive than the hand. The body should be entirely immersed, except in cases of heart or lung disease, when the chest must be left uncovered.

When used for the relief of pain, it is best to give the bath at the bedside. After remaining in for about ten minutes, the patient is taken out, quickly and lightly dried, and put to bed in a warm blanket. An hour should elapse before the blanket is removed.

When the hot bath is given to promote sleep, the patient is taken out at the end of five minutes, thoroughly and quickly dried with a couple of warm towels, and put comfortably to bed in a warm night-dress.

If the case is one of kidney disease, the patient should remain in the water from five to ten minutes after the thermometer has registered 110° F. He is then quickly removed to his bed, and, without being dried, rolled up in a hot blanket which has been previously laid there. Another warm blanket is then wrapped closely

round him, especially about the neck, hot bottles put in the bed, and the bed-clothes replaced. If the patient is a male, a small towel should be pinned round the loins before he is put into the bath. When he is ready for removal, a hot blanket is laid across the top of the bath and the towel unpinned. As he rises, or is lifted out, the blanket is wrapped round him. The patient must be kept as warm as possible, since the only object of the bath in kidney disease is the production of profuse perspiration. The skin must therefore be carefully guarded from the least semblance of a chill. But little good can result from the hot bath if the patient is dried, put into a cotton night-gown, and placed between sheets. Perspiration will then be very slight. Cold water should be given the patient to drink after removal from the bath, as this encourages in a marked degree the secretion of sweat. After remaining in the blankets for about an hour, the patient is gradually uncovered, sponged with tepid water, dried with warm towels, taken out of the wet blankets, and put to bed. As this is a very exhausting method of treatment, the patient must be carefully watched for any sign of faintness or prostration.

When the bath is given to produce muscular relaxation, the patients are generally children suffering from convulsions or spasmodic croup. If the latter, they are often frightened by the sight of the steaming water. It is therefore a good plan to place a towel or blanket across the top of the bath, and lower the child on it. In both cases the child should be immersed to the neck, while cold water is squeezed out of a sponge over the head. Hot water should be

added to the bath very carefully, as a child's skin is much more tender than an adult's, and will not stand a higher temperature than 103° to 105° F.

During the time that a patient is in the hot bath, a cloth rung out of cold water may advantageously be kept on the forehead. At the same time the nurse must carefully watch the patient, removing him at once on the least indication of faintness.

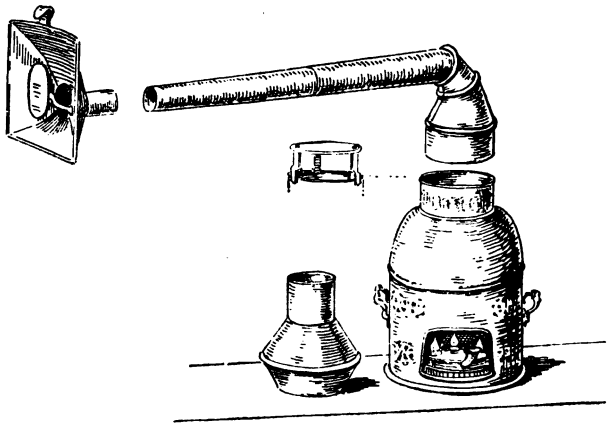

Fig. 2.—*Allen's Hot-air Bath.*

2. **Hot-air Bath.**—For giving this, Allen's apparatus, minus the boiler, is the most convenient.

A blanket is first placed beneath the patient and his night-dress taken off. A small blanket folded double is next laid over him, the bed-clothes are removed, and two body-cradles of wickerwork arranged so as to cover the whole body from the shoulders down to the feet. The cradles are covered with a blanket, that with a macintosh, and that again with

a second blanket. The object of the macintosh is to prevent the escape of hot air. A bath thermometer is placed just within the cradles at the head of the bed, and the blankets are then well tucked in, especially about the neck and shoulders, the handle of the bath thermometer, however, being left outside. Then from the foot of the bed is drawn away the blanket that was folded over the patient, and the spout of the kettle placed just within the lowermost cradle. If the kettle is placed upon the box from which it has been taken, it will be raised to exactly the right height for an ordinary hospital bed. It is as well to wrap a piece of flannel bandage round the spout, otherwise the blankets, which are to be tightly pinned round it, may be scorched. The cradles, if of iron, must be similarly protected. The kettle may be heated either by spirit-lamps or by gas. A cloth wrung out of iced water should be laid on the patient's forehead, and frequently changed while the bath lasts. At the same time, cold water should be given him to sip, as this encourages the flow of perspiration. This form of bath lasts, as a rule, for about half an hour, the temperature, which should be raised very gradually, ranging from 110° to 160° F. The maximum both of time and temperature will only be endured after the patient has been subjected to this form of treatment for some time. If the patient is perspiring freely, or the heat of the bath is sufficient, one or more of the lamps may be put out, or the gas, if being used, may be partially turned off. While in the bath, the patient should never be left, but should be most carefully watched. At the first sign of exhaustion or faintness, the lamps must be put out and the cradles removed.

When the bath is finished, the kettle and thermometer are first removed. Then the small folded blanket, which should be very warm, is put under the cradles from the top, and pushed as far down as possible. Then, going to the foot of the bed, the nurse passes her hand beneath the cradles, and draws the blanket down, so that it completely covers the patient. This is to prevent any risk of burning the patient, when the heated blankets fall on him as the cradles are removed. With a dropsical patient and very hot blankets this accident might otherwise happen. With as little disturbance as possible the cradles and macintosh are then withdrawn, and the bed-clothes allowed to fall quietly upon the patient. These coverings should be allowed to remain some time, the blankets both below and over the patient, as they get wet with perspiration, being from time to time replaced by warm dry ones. When the skin has ceased to act, the patient should be sponged with tepid water, and a warm night-dress put on.

3. **Vapour Bath.**—A macintosh is placed beneath the blanket upon which the patient lies, and Allen's apparatus with the boiler, or an ordinary bronchitis- or croup-kettle, used for producing the steam; otherwise the arrangements are the same as for the hot-air bath. Care must be taken that hot water does not drip from the nozzle of the bronchitis-kettle on to the patient. This is prevented by hanging a small tin on to it, or by the use of absorbent wool. Allen's apparatus has a special shield for the steam to strike against. This is hung on the outside of the lowermost cradle. The same precautions must be used to guard the patient against the least breath of cold air, and also to anticipate the occurrence of fainting, that

were mentioned in the description of the preceding bath. A vapour bath, when given to an adult, usually lasts about thirty minutes, the temperature ranging from 105° to 120° F. This is naturally much lower than that of the hot-air bath, since dry heat, as is well known, can be borne of a much higher temperature than moist heat. When the bath is finished, the patient is treated in the same way as after a hot-air bath.

Some medical men prefer to have their patients wrapped in a blanket during a vapour bath. Under these conditions the character of the bath is altered, the skin not being exposed to the action of the vapour. Unless Allen's apparatus is used, it would be safer to treat young children in this way.

Either a vapour or a hot-air bath can be given to a patient sitting in a chair beside his bed. A chair with a wooden bottom, the seat and back of which should be covered with a blanket, is taken, and the kettle arranged so that the spout projects beneath the chair. It should be placed at one side of the chair, so that the steam does not play on the patient's legs. The patient, whose night-dress has been removed, is then, from the chin downwards, closely enveloped in blankets, which pass from the front of him round to the back of the chair. They are carefully pinned round the nozzle of the kettle, so as to exclude cold air and prevent the escape of warm. The after-treatment has been already described. If a hot-air bath is to be given, the funnel and boiler are removed, and the rest of the bath with the lighted lamp inside placed underneath the chair.

4. **Hot Wet Pack.**—The patient is prepared in the

same way as for a cold pack. The sheets in which he is wrapped are wrung out of water at a temperature of 110°. After they have been put on, two or three hot blankets are rolled tightly round the patient, especially about the neck, and the bed-clothes replaced. In a short time profuse perspiration ensues. At the end of half an hour, which is the time usually ordered, the patient is rapidly sponged with tepid water, dried, and put into a warm bed. While doing this, great care must be taken by the nurse in guarding him against a chill.

5. **Dry Pack.**—No sheet is used in this form of pack. The patient is closely wrapped up in several hot blankets, and left for as long as the physician has ordered. The dry pack is another very efficient promoter of profuse perspiration. After the pack the patient is sponged, dried, and put to bed.

This form of pack is always used when a hypodermic injection of pilocarpine is given, a drug which quickly causes copious sweating.

Before leaving the subject of hot baths it will be, perhaps, as well briefly to enumerate the principal points which a nurse should bear in mind when giving one of them:—

(*a*) The temperature of the bath must be gradually raised, and constantly watched.

(*b*) The patient must be neither scalded nor burnt.

(*c*) The bath must be stopped on the first sign of faintness.

(*d*) The patient must be carefully guarded from cold air, both during and after the bath.

(*e*) He must not be left alone while in the bath.

Miscellaneous Baths.

Under this heading will be mentioned various baths which are used in the treatment of disease, which differ both in their mode of application and object from those previously described.

1. **Continuous Bath.**—This bath is used for extensive burns, certain forms of skin disease, and large wounds with much sloughing and offensive discharge. It acts by keeping the injured surface constantly clean, thus putting it in the best possible condition for repair. It is also now being used by some physicians in the treatment of enteric fever. The bath, which may last for some days, should be kept as nearly as possible at about the normal body temperature. If the patient complains of feeling cold, it might be raised to 100° F., but should not under ordinary circumstances go above this point, nor fall below 96° F. A water-cushion is placed at the bottom of the bath for the patient to rest on. A support for the head is made by arranging some pieces of webbing or bandage across the upper end of the bath, and on that laying an air-cushion. To retard the escape of heat, the bath should be covered with a long macintosh sheet and a blanket. It must be kept at an even temperature by the abstraction and addition of an equal quantity of water at least every hour. Three times a-day, or more often if necessary, the patient must be lifted out, wrapped in a warm blanket, and placed on her bed that she may use the bed-pan; twice during that time the water should be entirely changed. A thermometer must be kept constantly in the bath. It should be

suspended from the side, so that it hangs in the water.

The patient, particularly if a child, should never be left alone while in the bath.

2. **Local Baths.**—These are hot baths, acting upon a limited area of the body.

(*a*) *Arm and Leg Baths.*—These are given in special trough-shaped baths, and are generally used for foul wounds. The bath should be half filled with water at 100°, and, after adding to it the lotion which is ordered, carefully arranged on the bed with sand-bags or pillows, so that it is comfortable, and cannot easily be overturned. The arm, or leg, as the case may be, is then laid in it, and the bath covered with a small blanket to hinder cooling. The water should be changed every hour. If the limb is very painful, the water can be siphoned off; by doing this, all disturbance of the patient will be avoided.

(*b*) *Hip Bath*, or sitz bath, as it is sometimes called. It is most useful in cases where there is disease of the pelvic organs. It acts upon them in the same way as a poultice or fomentation does when applied to the chest in cases of lung disease.

The bath must not be filled too full. The temperature of the water ought to be about 105°. A blanket should be arranged round the patient and bath, so that the upper part of the former may not be chilled, nor the temperature of the latter too quickly lowered.

(*c*) *Foot Bath.*—This is sometimes used for sprains, but more frequently in the hope of checking a commencing catarrh. In such a case an ounce of mustard is often added to the bath. The temperature of the

water should be about 110° F., and the feet be kept in it for ten minutes.

3. **Mustard Bath.**—This is sometimes used in cases of convulsions, spasmodic croup, or measles when the rash has not developed properly; also for young children when collapsed after severe diarrhœa.

An ounce of mustard should be added for every five gallons of water. Some physicians prefer to have it double this strength. The mustard may be put into a muslin bag, from which it is squeezed out when put into the water, or it may first be mixed with a little warm water and afterwards added to the bath: it should never be sprinkled on the surface of the water. As this form of bath is generally used for children, the temperature, starting at 100°, should not rise above 105° F. The nurse will support the child in the bath, and remove it when her own arms begin to tingle.

4. **Mercurial Vapour Bath.**—To give this, a patient must have a vapour bath when sitting upright in a chair. A small dish containing the amount of calomel prescribed is placed over a spirit-lamp under the chair. The calomel is converted by the heat of the lamp into vapour, which is carried upwards by the steam, and deposited upon the patient's body. When all the calomel has disappeared, the bath is stopped, a warm flannel nightgown put on, and the patient placed in bed. The calomel must not be wiped off, otherwise no benefit would follow upon its use.

5. **Sulphur Bath.**—For every gallon of water which is going to be put into the bath, take a quarter of an ounce of sulphuret of potassium. Dissolve this amount in two gallons of boiling water,

and add to the bath, the temperature of which should rise from 100° to 110° F.

6. **Iodine Bath.**—This is used to stimulate slow-healing ulcers, and may be given as a partial or local bath. To every gallon of hot water one-sixth of an ounce of tincture of iodine is added.

7. **Bran Bath** is prepared by boiling 4 lb. of bran in a gallon of water, straining, and adding the infusion to an ordinary hot bath. While in the bath the patient should not be rubbed. If it is necessary to moisten the face, it should be dabbed with a very wet sponge.

8. **Alkaline Bath** is prepared by adding 6 ounces of carbonate of soda or potash to a hot bath. This bath is usually given for rheumatism. The patient must be very gently handled, and not hurried or chilled.

9. **Electric Bath.**—This is given as a stimulant to the nervous and muscular systems. The patient having been put into a hot bath, the two poles of the battery are placed in the water. The current should be mild at first, and then gradually increased in strength. The bath should last for about fifteen minutes.

10. **Brine Bath** is prepared by adding about 6 lb. of common salt to an ordinary hot bath. It acts as a slight stimulant to the skin.

11. **Starch Bath.**—Dissolve 2 lb. of starch in cold water. Add enough boiling water to form a thick mucilage. This will be sufficient for a long bath half full of water.

12. **Acid Bath.**—Add 1 ounce of strong hydrochloric acid to every 10 gallons of water.

CHAPTER X.

HOT AND COLD APPLICATIONS.

ONE of the commonest of a nurse's duties is the application to an inflamed or painful part of a fomentation or an evaporating lotion. Both of these remedies have for their object the hastening of repair in the inflamed part, as well as the relief of pain. A clear understanding of their method of action will not only render their use more interesting, but will prevent the mistake nurses occasionally fall into of supposing that, if in a particular case a hot application does good, it necessarily follows that a cold one will do harm.

Inflammation.—When from any cause a part of the body becomes inflamed, the following changes successively take place in its tissues:—

To begin with, the blood-vessels dilate and become more and more full of blood-cells, the current at the same time getting slower and slower, until at last it ceases altogether. There is now a complete block in the over-distended vessels, which are closely packed with red and white blood-cells. This accumulation of cells is due to the fact that the vessel wall has been damaged by the irritant which is causing inflam-

mation, hence the blood-corpuscles have a tendency to stick to it and so block the way.

Following upon this, the contents of the smallest, and therefore most thin-walled, vessels begin to escape into the surrounding tissues, so that the part becomes swollen. It is also tender, because the blood-cells (which are almost all white corpuscles) and fluid that have escaped from the vessels are pressing upon the delicate nerve filaments of the part, and so are giving rise to sensations of pain.

After a time, if the cause of the inflammation be not too severe and have ceased to act, the contents of the vessels begin to move onward, the cells which have produced the block detaching themselves one by one and passing away, until at last the current of blood runs through the vessel as freely as it did before inflammation commenced. At the same time the cells and fluid which are in the tissues outside the vessels are carried away by the veins and lymphatics, and the parts which they had invaded resume their normal condition.

If, however, the irritant be sufficiently intense, or long continued in its action, the block in the vessels continues, more and more of the white cells escaping, until at last an abscess is formed.

To recapitulate. When any part of the body becomes inflamed, the following changes successively occur in its blood-vessels:—

(*a*) They become more full of blood. This is the stage of "congestion."

(*b*) They become blocked with blood-cells, so that the current ceases to run. This is the stage of "stasis" or standstill.

(*c*) Their contents begin to escape into the tissues outside.

This inflammatory process may terminate in one of two ways—

(*a*) Resolution. The block in the vessels is removed, the cells in the tissues pass away, and the inflammation is at an end.

(*b*) Suppuration. Inflammation persists, until at length pus is formed.

Treatment of Inflammation by Heat and Cold.—Heat, when applied to the skin, causes redness, because it dilates the vessels, and so increases the quantity of blood in the part. Cold produces the opposite effect, causing the skin to become white by contracting the vessels, and so diminishing the blood supply.

For the purpose of treatment, the process of inflammation may be roughly divided into three stages.

In the earliest stage, viz., that of congestion, our object is, if possible, to avert the inflammatory process —*i.e.*, to prevent the escape of cells and fluid from the blood-vessels. This we are more likely to accomplish by means of cold than heat, owing to the effect which the former has in diminishing the blood supply of a part. Hence, the usefulness of iced compresses and evaporating lotions in the early treatment of a sprain.

In the next stage inflammation has become established. Our object now is to bring it to an end as quickly as we can ; and, if possible, to prevent the onset of suppuration. This is the stage in which either hot or cold applications may be used. For

while the latter diminish the blood supply, and with it the amount of fluid and cells which are escaping from the vessels, the former, by dilating the vessels, bring more blood to the part, which may possibly clear the way, by washing on the cells which are blocking the vessels.

In the last stage suppuration is inevitable, and here hot moist applications are the only treatment that is admissible; for they relieve pain, hasten the formation of pus, and render its passage to the surface easier.

The Reflex Action of Heat and Cold on the Internal Organs.—It is not difficult to understand the effect of hot and cold applications upon the superficial structures—*i.e.*, the parts lying immediately beneath the skin. It is less easy to explain the action of these agents upon the internal organs. A fomentation applied to the abdomen will relieve the pain of intestinal colic; while an ice-bag will check diarrhœa, and a linseed poultice on the chest will remove the unpleasant sensation of tightness and stuffiness which is associated with the commencement of acute bronchitis. It is impossible to suppose that the cold of an ice-bag, or the heat of a poultice, extends from the skin through the chest or abdominal wall to the organs beneath. That is quite out of the question. In such cases heat and cold transmit their influence in a roundabout way by means of the central nervous system. When, for instance, an ice-bag is placed upon the chest or abdomen, an impulse passes along the nerves running from the skin to the spinal marrow. From the spinal marrow the impulse returns along the nerves which run to the arteries supplying

the organ above which the ice-bag is placed. As a result, those arteries contract, so that a smaller quantity of blood passes through the organ than did before the ice-bag was applied. In this case the ice-bag is said to have produced a "reflex" or indirect contraction of the internal vessels, since its influence passed to them indirectly through the central nervous system. At the same time it would be causing a direct contraction of the vessels in the skin upon which it was lying. In the same way, a key applied to the nape of the neck will often check bleeding from the nose, by causing a reflex contraction of the blood-vessels in the interior of that organ.

Hot Applications.

When applying heat of any kind, a nurse must take particular care in the case of patients who are completely or partially unconscious, or are suffering great pain, or have dropsy, or are paralysed in any way, or subject to fits. Any of these conditions may lessen the patient's sense of external discomfort; and an exhausting and slow-healing wound may be produced by the incautious application of too great heat.

Hot applications may be either moist or dry. The former are the more efficacious, their influence penetrating farther and lasting longer; while the latter can be borne at a higher temperature.

1. **Poultices** are of various kinds, and may be made of almost any sort of meal that will retain heat and moisture.

(*a*) *Linseed Poultice.*—Crushed linseed is most commonly used for a poultice. The oil which it contains

is useful both as an emollient and as a retainer of heat. To make the poultice, a nurse requires a poultice-board, a suitable bowl, a strapping-can, a spatula or a long, flat, pliable knife, together with the tow or linen on which the poultice is to be spread. If tow is used, it should be pulled out so as to lie flat and even.

Half fill the basin with boiling water, then fill the strapping-can and put the spatula in it. When the basin is quite hot, empty it, and putting in a sufficient quantity of water, add the linseed quickly, sprinkling it with one hand while stirring with the spatula. When it is sufficiently firm and free from lumps, and comes clean away from the edge of the dish, turn it out on the linen or tow, and spread evenly and quickly with the spatula, dipping the latter in the strapping-tin between each stroke. The layer of linseed-meal should be a quarter of an inch deep, and it should be spread to within 1 inch of the edge of the linen or tow, when the former should be folded and the latter rolled in all round. It should be carried to the patient doubled on itself, and rolled in hot wool or between two hot plates. Care should be taken that it is not applied too hot. To assure herself that it is of the right temperature, the nurse should apply the back of her hand to it. If any of the linseed adheres to her hand, the poultice has been badly made, and should be discarded. When the poultice has been placed in position, it is covered with a thick layer of cotton wool, extending an inch beyond it in every direction, and secured by a bandage. When changing a poultice, the nurse should undo the bandage, but not remove the old poultice

till the hot one is ready to replace it. At least once in twenty-four hours the part should be washed. A linseed poultice is usually changed every four hours. Sometimes a piece of muslin is laid over it, or the surface is rubbed with warm olive-oil, to prevent it adhering to the skin. If the poultice has been well made, neither of these precautions is necessary.

When poultices are used to relieve internal pain in any part, and when lightness is not essential, they may be applied in a flannel bag, in shape like an old-fashioned postman's bag.

The boiled linseed or oatmeal, which may here be used, is put into the bag with a spoon, pressed out flat, covered with wool, and secured in position with a bandage, the flap of the bag being fastened down by a few stitches. The advantage of this poultice is that it may be applied hotter, and retains its heat longer, than one made on tow or linen. The nurse should see that she is supplied with at least three bags, as they must be washed and dried before being used again.

Linseed poultices are sometimes applied to wounds to promote the separation of sloughs. The boiling water in such cases usually contains an antiseptic such as carbolic acid or chlorinated soda.

A jacket poultice should be made on linen, and in two halves, one for the front, the other for the back of the chest. After being covered with wool, it is secured in place by a many-tailed bandage with shoulder-straps. The linseed should never be more than a quarter of an inch thick, otherwise its weight increases the already existing difficulty of respiration.

(*b*) *Charcoal Poultice.*—This is sometimes used for offensive sloughy wounds, charcoal being an excellent

deodorant. It is, however, a dirty application, and has now been almost superseded by hot wet antiseptic dressings. One part of charcoal is mixed with four of linseed-meal or bread crumbs, and sufficient boiling water added to make it of the right consistency. The wound needs careful cleansing each time the poultice is changed.

(*c*) *Bread Poultice.*—This is not very often used, as it does not retain the heat for any length of time. A sufficient quantity of stale bread-crumbs is mixed with boiling water, and allowed to stand for ten minutes in a vessel which is placed in boiling water. It is then well stirred up with a fork, the water poured off, and more boiling water added. This is left for about a minute and then drained off, the poultice being now spread and applied. It should be changed very frequently, as it quickly cools and cakes. To prevent the bread-crumbs adhering to the skin, the latter should be rubbed with some simple ointment, or warm oil spread over the poultice.

(*d*) *Starch Poultice.*—This is sometimes used in irritable affections of the skin, as it forms a very bland and soothing application. A little cold water is first added, and then sufficient boiling water to make it into a thick paste. It should be spread on muslin or soft linen, and applied like a linseed poultice.

(*e*) *Yeast Poultice* is sometimes used as a gentle stimulant to a slow-healing ulcer. Three ounces of yeast are mixed with half a pound of linseed-meal or wheaten flour, three ounces of water at 100° F. are added, and the poultice put into a muslin bag large enough to permit the dough to rise. It is now placed

near a fire, and when the dough has risen applied to the wound.

(*f*) *Mustard Poultice.*—This is a very common and most useful form of poultice. The proportion of mustard to linseed varies with the age of the patient and the object of the poultice. If it is being used for the relief of pain in an adult, equal parts of mustard and linseed may be used, the application being removed at the end of fifteen or twenty minutes. If the poultice is being applied to the chest for bronchitis, one part of mustard to two of linseed should be used for an adult, and one to five for a child. The mustard is made into a paste with lukewarm water, and the linseed into a poultice with boiling water; the two are then thoroughly mixed and at once applied.

When equal parts of mustard and linseed are used, which should be done if no directions as to strength are given, the surface of the poultice should be covered with fine muslin. This poultice is intended to redden the skin, not to blister it, and the nurse must be very careful that the latter effect is not produced. After removing it, the part should be dried, and the skin carefully examined to see that no particles of mustard are adhering to it. It is then dusted with powder and covered with cotton wool, or a plain linseed poultice applied, according as the nurse has been directed. This should be done quickly and thoroughly, as exposure to the air intensifies the irritating and stinging effect of the mustard.

The efficacy of a poultice as a means of applying moist heat to any part of the body depends upon the nurse, who should see that it is made of water that is quite boiling, and that the tow or linen, basin, and

spatula are properly warmed. It is only by taking these precautions that a poultice can be applied at a suitable heat. When a poultice is finally omitted, the part should be covered for two or three days with a thin layer of cotton wool.

2. **Fomentations or Stupes.**—This is the cleanest and most convenient form of locally applying moist heat. If used for the relief of urgent pain, a fomentation should be changed every twenty minutes. They are frequently left on for two hours at a time, but unless they are very carefully covered in by wool and bandaged closely to the skin, they become chilly and uncomfortable long before that period has elapsed. The best material for a stupe is soft old flannel, though lint and absorbent wool are often used. Two thicknesses of the material, if it be flannel or lint, are required. A stupe-wringer is advisable, though a towel is sometimes used instead. The wringer is made of ticking or stout towelling, 18 inches long and 10 wide, with a broad hem at each end, through which is passed a stout piece of wood the shape of a ruler. The wringer is laid in a warmed basin, and the two thicknesses of flannel or lint spread out on it. Boiling water is then poured over it, after which, by twisting the two pieces of wood in opposite directions, the fomentation is wrung out quite dry. If any superfluous moisture is left in it, it cannot be borne so hot by the patient, and is more likely to scald him. The fomentation is carried to the bedside in the wringer. It is there taken out, shaken to admit air between its folds, and put on as hot as the patient can bear. It is then covered over with another piece of flannel or jaconet, which must be an inch longer in every

direction than the fomentation. Over this a thick layer of wool is placed, and the whole bandaged firmly in position. The wool is used to keep the heat in the fomentation, not to prevent the escape of fluid, since this in a properly made fomentation practically does not exist.

Turpentine Fomentation.—This is prepared as follows: After pouring the boiling water over the flannel and wringer, add 2 ounces of turpentine; this will float on the surface of the water. Lift the wringer out as straight as possible, so that the turpentine may be spread evenly over the surface of the fomentation, and wring quite dry. A more even distribution of the turpentine is possible by this method than by sprinkling the drug on the fomentation after the latter has been wrung out. This fomentation is not, as a rule, repeated, but is followed by a simple stupe or warm cotton wool. After removing it, the nurse should look carefully for any spot that is especially red, or is blistered, and should cover such spots with small pieces of lint spread with simple or other ointment; or, if the skin is very red, dust it with zinc and starch powder.

Opium and belladonna are sometimes applied on stupes, half a teaspoonful of the tincture being sprinkled on the flannel after it has been wrung out. As some people are peculiarly susceptible to the influence of belladonna, the nurse should carefully note and report any dilatation of the pupils or complaint of dryness of the throat, both of which symptoms point to a slight degree of belladonna-poisoning.

Spongiopiline is a thick, felt-like, absorbent material, one side of which is covered with waterproof to pre-

vent evaporation. It may be used in the application of any of the fomentations mentioned. It is somewhat difficult to wring sufficiently dry, and is also expensive, so that it must not be rejected after being once used.

Hot Sponges may be used to foment the face or throat. They should be wrung dry, applied as hot as possible, and changed continually. Such a fomentation can only be used for a short time.

The nurse must exert some ingenuity in cutting the fomentation, so that it may accurately fit the part to which it is to be applied. In fomenting the breast, the flannel should be round, with a hole in the centre for the nipple, and slit out one side so as to fit comfortably without rucking. When a limb is to be fomented, it should be done in sections, as it would be difficult to apply one large piece of flannel sufficiently hot.

3. **Hot dry Applications—**

(*a*) *Hot Bottles* may be made of tin, earthenware, or indiarubber. For the feet either of the first two materials would do; when the bottle is to be applied to any other part of the body, an indiarubber bag is more comfortable and efficacious. A hot bottle should always be entirely encased in a thick flannel bag, which must have no holes in it. Care must be taken that the bottle does not leak, and that, when it is put into the bed, it does not rest against the patient. Nothing reflects greater discredit on a nurse, or is more annoying to her, than to have to report a burn produced by a hot bottle. Particular care should be taken in the case of children, and patients who are unconscious. These should be kept under frequent

observation by the nurse. The bottles should be changed at frequent intervals, and, if possible, without disturbing the patient.

A hot brick wrapped in flannel is sometimes used instead of a bottle.

(*b*) *Hot Wool* or flannel is often used for inflamed joints, or for abdominal discomfort or pain. A thick piece of brown cotton wool or flannel is toasted in front of the fire, or heated in the oven between two plates. It must be changed frequently, and, if the patient is restless, lightly secured in place by a bandage.

(*c*) *Hot-bran Bag.*—Two soft muslin bags are half filled with bran. One is put in the oven between two plates, and, when sufficiently warm, applied, being afterwards covered with hot wool. The second is got ready against the time that the first is removed. Bran bags are light and comfortable when heat is required for a limited period; but, as they do not long remain warm, they become troublesome.

Salt- or hop-bags are made and heated in the same way.

(*d*) *Pneumonia Jacket* is used for children with bronchitis or broncho-pneumonia, when a linseed poultice is unnecessary, and it is merely desired to keep the chest warm; or it may be used after a poultice has been taken off. It is cut out in soft muslin, or linen, which is double, and between the two layers is laid a single sheet of brown wool. The edges are lightly quilted and tacked down. The back and front are fastened together down one side and across one shoulder, the other side and shoulder being secured by tapes.

Cold Applications

Are most useful during the early stages of an inflammation, since they tend to check the process by their contracting influence upon the blood-vessels, and consequent diminution in the escape of their contents. Great care, however, is necessary to see that they are cold; and that an iced compress does not, by neglect on the part of the nurse, become converted into a lukewarm fomentation. When this happens, more harm than good has been done by the use of cold; for during the reaction which necessarily follows, there is a great increase in the quantity of blood flowing to the part, and as a result a further advance in the process of inflammation.

1. **Ice-bags** are made of various shapes and sizes to suit the part to which they are to be applied. The most useful is the cap-shaped ice-bag. This should be half filled with small pieces of ice, with which may be mixed a little common salt to intensify the cold; or sawdust may be added, since this, by soaking up the water, makes the ice last longer. Care should be taken to see that the plug which closes the opening fits accurately, or water may escape from it into the bed. A single fold of lint should always be placed between the patient's skin and the ice-bag. The bag must be refilled before all the ice is melted, other-

Fig. 3.—*Ice-bag.*

wise it merely becomes a receptacle for lukewarm water.

2. **Ice Poultice.**—This may be made in the following way: Take a double thickness of gutta-percha tissue a little larger than the area to be covered. Sprinkle on the lower leaf of the tissue a thin layer of linseed-meal, and upon it place ice, crushed small, to the depth of half an inch. Sprinkle the ice with common salt, and on the top of it add another layer of linseed-meal. Turn the upper leaf over the lower, and then seal the edges with chloroform or turpentine. Put the poultice into a flannel bag, and place under it a fold of lint.

3. **Iced Compress.**—Three thicknesses of lint are cut to a suitable size and shape, and squeezed out of the iced lotion between two flat wooden discs connected by a hinge, or they may be wrung dry in the same way as a fomentation. This is done to avoid the heat of the hand. If a bandage is required to keep them in position, as when the eye is being treated, a single turn is all that is required. A block of ice should stand in a bowl beside the bed, with another compress ready to replace the one in use. They should be frequently changed, and require unremitting attention to be effective.

4. **Evaporating Lotions.**—A single fold of lint is used, and the part to which it is applied left exposed, so that evaporation may be accelerated. To put on jaconet and a bandage is a great blunder, since the application straightway becomes converted into a fomentation, producing exactly the opposite effect to that which was intended. Frequent changing is necessary to ensure that the lint remains moist, or if

it is on a part like the knee, it is better to drop lotion on the lint. To keep the bed clean, a draw-sheet and a macintosh should be placed under the part that is being treated.

5. **Leiter's Tubing** is soft metal tubing, the coils of which are arranged in the shape of a cap, so that it can be easily applied to the head, that being the part of the body for which it is generally used. From the upper end of it a rubber tube leads into a can of iced water. From the other end similar tubing runs to a receptacle on the floor. By means of a clip on the

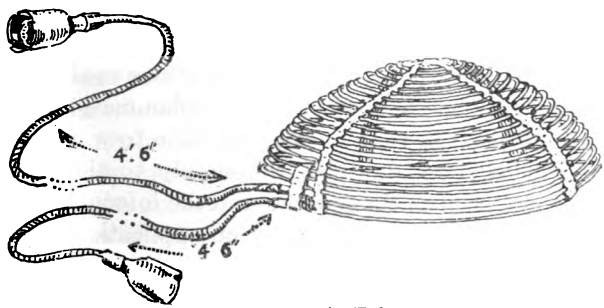

Fig. 4.—*Leiter's Tubing.*

upper piece of rubber tubing, the speed with which the water passes through the coil can be exactly regulated. To start the water running, the nurse holds the upper end of the topmost piece of rubber tubing firmly in her left hand, while she passes the thumb and first finger of her right hand down the whole length of it, squeezing it firmly as she does so. This will expel the air, so that when the left hand relaxes its hold water will rush into the tube, and the right hand now releasing the lower end, the apparatus begins to work.

CHAPTER XI.

COUNTER-IRRITANTS—SYRINGING THE THROAT, NOSE, AND EARS.

COUNTER-IRRITANTS are local applications used for the relief of pain or the checking of inflammation. By drawing blood to that part of the skin to which they are applied, they diminish the supply to the deeper structures, such as the muscles and the internal organs which lie beneath their point of application. This latter effect is probably produced by reflex action, as was explained in the previous chapter, when the influence of heat and cold on the various parts of the body was discussed. The action of the different members of this group varies in intensity from a mere blush up to actual inflammation, as evidenced by the presence on the skin of vesicles or even pustules.

1. **Mustard Plaster** is much stronger than a mustard poultice. To two parts of fresh mustard add one of flour, and make into a paste with tepid water. Spread evenly on a piece of linen cut to a suitable shape and size, and cover with a single layer of washed muslin and apply. It should be left long enough (about twenty minutes) to thoroughly

redden, but never to blister, the skin. If necessary, it may be secured in place with a bandage. Less mustard and more flour may be used; this would be advisable in the case of a child. If the patient is unconscious, or in great pain, the nurse must carefully watch the effect of the plaster, or a troublesome sore may result. After the plaster has been taken off, the nurse should carefully wipe the skin, to remove any particles of mustard that may be adhering to it, dust with starch powder, and cover with wool and a bandage.

2. **Mustard Leaves** may be used instead of the plaster. They are more convenient, being always prepared and ready to hand at any chemist's; but they are somewhat uncertain in their action, and are liable to produce such an extreme degree of discomfort as to necessitate their removal before any good effect has had time to follow their application. The part should first be washed, the mustard leaf moistened in warm water, and kept in place by wool and a bandage. In the case of children, or people with sensitive skins, the surface of the leaf should be covered with a layer of washed muslin, to diminish the irritation. For such patients a moderately weak mustard plaster is preferable. When the mustard leaf is removed, the part should be dusted with starch or other powder, and covered with wool.

3. **Iodine.**—Before applying tincture of iodine, the part should be well washed with soap and water. The iodine is then painted on with a camel's hair brush. After the first coat has dried, a second should be applied. In the case of children one is enough. Liniment of iodine, which is four times as strong as the

tincture, is sometimes ordered, either alone or diluted with the latter preparation.

4. **Liniments** are very mild counter-irritants which are rubbed in by hand after the part has been washed. Rubbing should be continued until the part is fairly dry and the skin red and glowing. More rarely, a piece of lint is soaked in the liniment and bandaged on the part. In such a case the nurse must take care that the effect is not more severe than is required.

5. **Blister.**—This is a much more severe form of counter-irritation, since actual inflammation in the shape of a blister is set up. Cantharides, the Spanish blistering fly, is the agent used. It may be applied as a plaster or painted on the part.

When the plaster is used, the part should be well washed with soap and water, and sponged with ether to remove grease from the skin. The plaster having been cut to the size and shape required, is moistened with warm water, placed in position, covered with wool, and secured with a bandage. This is fastened loosely, so that there may be no pressure on the bleb when it rises. For children a layer of fine washed muslin should be placed between the plaster and skin, to lessen the severity of its action.

When blistering fluid is used, the part to be painted should be outlined with oil, to keep the counter-irritant within bounds. Two or three coats are then painted on, each one drying before the next is applied, and the part covered with wool and a loose bandage.

The plaster should be left on for about ten hours, or in the case of a child half that time. It is then very carefully removed, and, if vesication is slight

or absent, a poultice or fomentation applied. The bleb which has been produced is snipped at its lowest point with a pair of sharp clean scissors, and the fluid gently pressed out with absorbent wool. It is then dusted with powder and some cotton wool bandaged on it. Sometimes the fluid is allowed to be reabsorbed, the bleb being left unopened and merely protected with wool and a bandage. A nurse should always obtain clear instructions from the medical attendant as to the size of the blister, and the exact locality where he wishes it applied.

6. **Croton-oil** is a very powerful counter-irritant which is but rarely used. A few drops are placed on flannel and rubbed in. It produces a pustular rush, which generally leads to permanent scarring of the skin at that part.

7. **The Actual Cautery.**—The instrument usually employed is that invented by a French surgeon named Paquelin. As a counter-irritant it may be used—

(*a*) *For the relief of pain*, in which case the heated point is not brought into contact with the skin, but is moved to and fro in close proximity to it, so as to produce a reddening of the surface.

(*b*) *For the treatment of chronic joint inflammation.* —Here the point of the instrument, being kept at a dull red, is lightly drawn across the part to be treated, so as to produce a superficial burn, which is dressed in the ordinary way.

8. **Leeches.**—Nowadays leeches are not often used merely for the purpose of bloodletting, that being much more easily and expeditiously accomplished by means of the knife. The relief of pain and the checking of

inflammation are the proper uses for leeches—*i.e.*, they are to be regarded rather as counter-irritants. Each leech withdraws from one to three drachms of blood. The smaller, pointed, end is the head of the animal.

Before applying a leech, the part should be washed, the soap being carefully removed with clean warm water. The skin is afterwards thoroughly dried and well rubbed with a towel, so that the blood may be brought to the surface. It is of great importance that the leech should be handled as little as possible, otherwise it will take much longer to bite. It should be allowed to crawl out of the box on to a clean folded towel, and from thence be directed on to the skin, care being taken not to apply it over any large vessel. If the leech refuses to bite, placing a drop of milk on the skin, or scratching the skin so as to draw blood, will often prove efficacious. If it seems to be working sluggishly, it may be stimulated by gently stroking its back with a piece of lint.

When a leech is ordered to be applied in the neighbourhood of the eye, it is placed in a test-tube half full of cotton wool, which should be held over it until it has commenced to suck, and then gently slipped away. This same method of application would be used, if it were desired that the leech should attach itself to one particular spot. When applied to the interior of the nose, mouth, or vagina, a thread should be passed through the tail by means of a needle. This controls its movements, and does not interfere with its working.

A leech will continue sucking for about three-quarters of an hour. It should be allowed to suck for as long as it likes, and never be forcibly removed,

otherwise its teeth may be left in the skin, when a troublesome and slow-healing wound is produced. A pinch of salt on the head will always make a leech relax its hold. If bleeding is to be encouraged, a fomentation should be applied to the bites, otherwise a pad of absorbent wool should be bandaged on the part. The patient should not be left for any length of time until the bleeding has ceased, as occasionally this is very troublesome, needing the use of styptics or even a red-hot needle to arrest it.

After removal, a leech should be destroyed, as it will be a long time before it is fit for work again. If it is desired to keep it, it should be placed in a plate of salt to make it vomit the blood it has taken, and afterwards put into a jar of water with sand or fine gravel at the bottom, and a perforated lid, the water being changed daily at first, and subsequently once a-week. A leech-bite always leaves a small triangular scar.

9. **Cupping** may be performed in two ways—viz., the dry and the wet. Both operations have for their object the drawing of blood from the deeper parts to the skin; but while the dry method leaves the blood in the skin, the wet allows it to escape into a cup by means of small incisions.

(*a*) For dry cupping five or six cupping-glasses, or, failing them, an equal number of port-wine-glasses are necessary, some methylated spirit, and a box of matches. A little spirit is poured into a cup, which is moved about so that the fluid is spread evenly over its surface; the excess is allowed to escape by turning the cup completely over. A small piece of paper is lighted and dropped into the cup; the spirit flares

up and the cup is at once applied, the flame being immediately extinguished. The heated air in the cup, as it cools, contracts and draws upon the skin, which is sucked up into the cup so as to make a distinct swelling. If the alcohol is allowed to burn out before the cup is applied, the edges of the latter may become so hot as to inflict pain upon the patient. The cups are generally left on for about three or four minutes, and should always be taken off before anything like bruising has been produced. When removing them, the nurse should press the skin down at the edge of the cup with the tip of her finger, so as to let air enter the cup, when it will easily come off.

(*b*) In wet cupping several small incisions are made in the skin with a scalpel, or a special instrument called a scarificator, before the cup is applied. This is then done in exactly the same way as for dry cupping. Blood is sucked out of the small cuts into the glass. After the operation is over, an ordinary dry dressing is applied, or the surgeon may order a fomentation to keep up the effect of the counter-irritation. This is also sometimes used after dry cupping. This method of treatment is most commonly used in inflammation of the kidneys, the cups being applied to the loins.

Ointments may be applied either spread with a spatula on the smooth side of a piece of lint, or they may be rubbed in by hand—that is to say, by inunction. This latter process is especially used in the treatment of scabies and of syphilis. Before rubbing in an ointment the part should be washed with soap and hot water, the ointment is then well rubbed in

with the palm of the hand, and a layer of flannel afterwards applied. Mercurial ointments should never be rubbed into the same part on two successive days. The inner side of the thigh and the armpit are parts that are generally used for this purpose. A nurse should always be on the look-out for any symptoms of mercurial poisoning, either in the patient or herself, for she must naturally, during the process of rubbing it in, absorb a certain amount of the drug. To avoid this risk, the patient may be taught to rub in the ointment for himself, or the nurse may do so with a piece of lint. The usual symptoms of mercurial poisoning are tenderness on biting, a feeling of soreness about the gums, together with an excessive flow of saliva. Their appearance in the case of the patient is an indication for omitting any further inunction until the medical attendant's wishes are known. If the nurse herself is the sufferer, she should give up rubbing in the ointment and ask somebody else to do it.

Lotions.—It has already been pointed out that evaporating lotions must be applied on a single thickness of lint, which is to be left uncovered. Lotions, other than evaporating, are used by soaking a double thickness of lint in them, squeezing out the excess of moisture, but by no means wringing them dry, and, after placing the lint in position, covering it with a piece of jaconet or oiled silk to prevent evaporation, and lightly bandaging it on.

Syringing the Throat.—This is very necessary in severe cases of scarlet fever and diphtheria, where the pharynx becomes full of thick muco-pus. Removing this makes both breathing and swallowing easier for

the child, while at the same time it tends to promote healing of the inflamed fauces.

The best form of syringe to use is the 4-ounce india-rubber ball syringe. The nozzle should be only 1½ inch long. If a long 3-inch nozzle is used, there is more risk of damaging the back of a child's throat with it, should the patient be restless. With the short nozzle this is almost impossible. It is as well to use two syringes, so that one may be filling itself in the porringer of lotion while the other is being used.

If it is likely to struggle, a sheet is wrapped closely round the child, so that it cannot move its arms. It is then sat up in bed. The nurse seats herself on its right hand, and, placing her left arm round its neck, keeps its head firmly pressed against her left side, while at the same time she bends it forward over the basin in front of her. She then takes one of the full syringes from the porringer of lotion, passes the nozzle between the child's *back* teeth into the mouth, and forcibly compresses the ball. Having given the child time to regain its breath, she empties the syringe, and replaces it in the porringer to fill again. She must be careful not to inject the lotion while the child is drawing in its breath, otherwise it may suck some of the fluid into its larynx. By passing the nozzle between or behind the back teeth, there is less risk of the tongue intercepting the lotion on its way to the inflamed throat; by bending the child's head over the basin, the chance of fluid getting into the air passages is very considerably diminished.

Syringing the Nose.—This is usually done when the throat has been finished, a weaker lotion and

the same syringe being used. A nurse should always be very gentle when syringing out a child's nose, as it is by no means pleasant; nor, if force is used, is it devoid of risk. For at the back of the nasal cavities on each side is the opening of the Eustachian tube, which leads into the middle ear. If the nose is forcibly syringed out, some of the discharge may be driven up these tubes into the ears, and there set up inflammation. There is no doubt that some cases of ear discharge originate in this way. A nurse ought never to attempt to force lotion into the nose when it is blocked by inflammatory swelling. She should place the nozzle of the syringe just outside the nostril, and gently play on the opening with a stream of lotion. No patient who is seriously ill ought to be made to sit up for the purpose of having his throat or nose syringed, if he is sensible enough to submit to the operation without struggling. It can be done equally easily in the recumbent posture, the head being brought to the edge of the pillow, so that the mouth hangs down over the basin.

Nasal Douche.—This is another method of cleansing the nasal cavities. It is preferable to syringing, inasmuch as there is no risk of undue force being used; at the same time, it means more apparatus, which is undoubtedly a drawback. Above the level of the patient's head is placed a glass vessel containing the warm lotion. In it is placed the weighted end of a piece of fine drainage tubing about 4 feet long. To the other end of the tubing is attached a small glass or bone nozzle. If there are two nurses, nothing in the way of special apparatus is needed, since one of

them can hold a porringer of lotion, with the upper end of the drainage tube in it, above the patient's head. Lotion is started running through the tube by the method described in the last chapter in the use of Leiter's tubing. The tube is then placed just within the patient's nostril, while he bends over the basin, breathing quietly with his mouth open. The lotion will, if the nasal passages are free, make its exit by the other nostril.

When the nurse has finished syringing a patient's nose and throat, she should take the bone nozzle out of the syringe and put it in a porringer to be boiled before being used again. It is as well to have several spare nozzles in a ward, so that each patient can have a clean one; those that have been once used being collected in a porringer and boiled at the end of the day. The same applies to the nozzle of a nasal douche.

Syringing the Ears.—Various forms of syringe are used for cleansing the ears. The brass one is about the best, though there is a very convenient little 2-ounce rubber-ball syringe. If the child is restless, it is as well to protect the nozzle with a small piece of drainage tubing. This is more especially necessary in the case of the brass syringe.

Seating herself opposite the affected ear, the nurse takes hold of it with her left hand, and draws it gently backwards and upwards. By doing this she tends to straighten the passage of the external ear, thus making it easier for the lotion to enter. The nozzle of the syringe is then placed just within the upper part of the opening of the ear, the handle of the

instrument being slightly depressed, so that the point of the nozzle is directed towards and touches the roof of the ear. The syringe is then gently emptied. As the lotion escapes from the ear it is caught in a kidney-shaped tray, which is pressed closely against the neck. Or a special trough can be hung over the ear, down which the lotion will run into a basin.

There are two reasons for holding the syringe in the way just mentioned, so that it may empty itself on to the roof of the external meatus.

1. *It is easier to cleanse the Ear.*—By syringing straight into the ear, any pus or wax that the external meatus may contain is driven inwards on to the drum, on which some of it will probably be left when the lotion flows back again. If, on the other hand, the syringe is pointed slightly upwards, it is emptied on to the roof of the meatus, along which the lotion runs till it meets the drum, when it turns down and runs out, washing everything in front of it. By no other method of syringing could a foreign body which had become firmly fixed in the ear be removed.

2. *It is more pleasant for the patient.*—If the syringe is emptied straight into the ear, the lotion falls directly on the drum. This is frequently both painful and startling to the patient. By syringing so that the lotion runs along the roof of the canal the drum receives no shock, and the operation becomes less unpleasant.

If the child is at all inclined to struggle, a second nurse should be present to hold it, otherwise it is impossible to properly cleanse the ear.

After an ear has been syringed, the meatus should be dried with absorbent wool, and its external opening carefully packed with the same. Should the child have a tendency to pick the wool out of its ears, a strip of bandage might be passed over them, and fastened on the top of the head, or paper splints be put round the elbows.

CHAPTER XII.

ENEMATA, ETC.

AN enema is a liquid preparation which is injected into the rectum.

It may be given with one of the following objects in view: To relieve pain, to diminish spasm, to stimulate, to kill worms, to produce an action of the bowels, to feed the patient. Its composition and size will vary with the purpose for which it is used.

The apparatus required will be described with each form of enema. The fluid to be injected must be prepared in a suitable vessel, and at the time of administration must be of the right temperature. When a large quantity is to be used with a Higginson's syringe, it is best prepared in a deep basin, and since it is always a matter of some difficulty to keep the end of the syringe under the fluid, a larger quantity than is actually required should be prepared.

After use, the apparatus should be most carefully cleaned. When a catheter is used, a copious stream of water should be allowed to run through it from the eye downwards. It should then be laid in some disinfectant, and again before use have a stream of water

run through it from the eye. Indiarubber tubing should be treated in the same way. Glass funnels, glass syringes, and pipettes should be washed in soapy water and rinsed in clean water, or they may be boiled in water containing some soap and a little soda, and kept in a clean place till required. If oil has been used, the whole apparatus should be boiled in water containing soap and soda, and afterwards rinsed with plenty of clean warm water.

When a Higginson's syringe has been used to give a soap-and-water enema, the nurse should first see that the nozzle is clean, and then pump plenty of warm water through it. If it has been used for oil, or any other medicinal enema, the water pumped through it should contain soap and a little soda. This should be repeated once or twice, and when the nurse has satisfied herself that it is clean, it should be rinsed with clean warm water and hung up with the nozzle downwards. These syringes should always be suspended from the metal end; for if folded up, they crack at the folds, and soon become useless. A rubber syringe shrinks and becomes hard when kept in a dry place, or when not in constant use. It is, therefore, a good plan to soak it in warm water before giving an injection.

Position of Patient during administration of Enema.—The patient is usually placed in one of two positions, on the left side or on the back. Very occasionally, when the case is one of obstinate constipation, the patient is placed in the knee-chest position. No doubt it is most convenient to have the patient lying on his left side, since the large intestine runs backward from the anal aperture in

the direction of the left hip; but it sometimes happens that it is impossible to put him in that position, as, for instance, after an abdominal operation, or injury to the spine or pelvis. In such a case the enema must be given with the patient lying on his back. This is more difficult, and nurses will find it a good plan to accustom themselves to this position, so that when necessary they may do it easily, and not cause the patient discomfort.

Turn the patient on to his left side, bringing him as near as possible to the right-hand side of the bed, so that the buttocks may almost project over the edge, incline the shoulders to the other side of the bed, and flex the knees. Place under the patient a warm macintosh covered with a towel or doubled draw-sheet, and turn back all the bed-clothes with the exception of one blanket. Having placed the fluid to be injected in a convenient position, and oiled the catheter or nozzle of the syringe, take it in the right hand. Now pass the index finger of the left hand between the buttocks, and lay it lightly on the anus, and pass the tube below the finger into the rectum, guiding it backwards and upwards. In doing this, it will be found that as soon as the nozzle touches the anus, the sphincter muscle contracts. No force must now be used, but the nurse should pause for a second, keeping the tube in place. Almost immediately the muscle will relax and the tube slip in. The nurse must take care to pass the tube over the small tongue of integument which is found at the anterior angle of the anus, otherwise, by pinching or turning it in, she may cause the patient considerable pain and discomfort.

If the patient may not be turned on to his side, he should, lying on his back, be brought as near the right-hand side of the bed as possible. The warmed macintosh being in position, and the bed-clothes limited to one blanket, the nurse flexes the patient's right knee, and placing the index finger of the left hand upon the anus, presses back the small fold of integument just mentioned. The tube is then gently passed with the right hand, being directed backwards and slightly downwards. Should the tube meet with any obstruction, it must be withdrawn a short distance and again pressed inwards. The obstruction may be caused by the end of the instrument coming in contact with a solid lump of fæcal material, or becoming entangled in a fold of the intestinal mucous membrane.

When the injection has been given, the tube should be gently and slowly removed from the rectum, and firm pressure at once put on the anus and perinæum with a folded towel, to assist the patient in retaining the enema.

Purgative Enemata. — Purgative enemata are given either with the object of assisting in an easy action of the bowels, as before and after operations, or for the relief of constipation. When the rectum is distended by a quantity of fluid, not only is any fæcal material which it contains softened and rendered easier of expulsion, but the whole of the large intestine from the cæcum onwards is stimulated to contract upon its contents, and thus force them towards the anal opening. Purgative enemata are best given in the early morning. The following are the principal forms of this enema:—

1. *Soap-and-Water Enema.*—This is made by dissolving 1 ounce of soft soap in a pint of warm water. For adults 1 pint is usually sufficient, though sometimes more is required; for children up to ten years of age 1½ ounce for each year is a very safe rule.

This form of injection is usually given with a Higginson's syringe, to the nozzle of which should be attached a No. 12 rubber catheter. The temperature of the enema at the time of use should be about 95°. If too hot or too cold, it is more likely to be speedily rejected, and hence less efficacious. Having carefully filled the syringe, so as to expel all air, the nurse oils the nozzle and introduces it as far as the shield; or, if a catheter is attached, passes that for 6-8 inches, and then very slowly and steadily pumps in the soap-and-water. There should be no attempt at hurrying, otherwise the enema may be instantly returned. Five minutes at least should be occupied in injecting 1 pint. If the patient complains of pain while the enema is being administered, the nurse must wait till it has passed off before she continues, which she should then do in a very gradual manner. For giving small soap-and-water enemata to young children, a rubber catheter and the barrel of a 2-ounce glass syringe should be used. The enema should be retained from ten to fifteen minutes, and the nurse can assist the patient in doing this by pressure on the anus and perinæum with a folded towel. When giving any sort of purgative enema, a warmed bed-pan should be ready at hand to prevent accidents.

2. *Glycerine Enema.* — This is usually given by means of a special vulcanite syringe holding half

an ounce. For an adult 1 to 2 drachms is sufficient, and half a drachm for a child. It should be given without the addition of water, as it acts by irritating the wall of the rectum, and thus causing the intestine to contract, besides inducing a secretion of fluid from it, which effects will naturally be much diminished by dilution. The only reason for adding water would be if the patient found pure glycerine too irritating.

3. *Turpentine Enema.*—When given as a purgative, 1 ounce of oil of turpentine is mixed with 15 ounces of thin starch.

More frequently this form of enema is used for the relief of abdominal distension in cases of typhoid fever, in which case half an ounce to 1 ounce of turpentine may be given in 2 ounces of starch. This is very efficacious in bringing about the expulsion of gas from the bowel, and does not cause so much disturbance of the patient as the larger enema. The smaller injection should be given by means of the apparatus described for the use of nutrient enemata, the larger by the Higginson's syringe.

4. *Olive-oil Enema.*—An ordinary olive-oil enema consists of 4 ounces of oil mixed with 8 ounces of starch mucilage; or a very common method is to warm 4 ounces of oil and run it into the bowel by means of a soft catheter and glass funnel, following it up in half an hour's time with an ordinary soap-and-water enema.

Olive-oil may also be given as a "*gravitation*" *enema.* This is used in very obstinate cases of constipation, such as are caused by lead colic and chronic obstruction. A pint to a pint and a half of warm oil is introduced into the bowel by means

of a soft rubber catheter, to which is attached a long piece of tubing and a glass funnel, the latter being held from 2 to 3 feet above the level of the patient, so that considerable force is exerted by the oil upon the interior of the bowel.

5. *Castor-oil Enema.*—This consists of 1 ounce of castor-oil mixed with 10 ounces of thin starch, or 1 ounce of castor-oil mixed with 3 ounces of olive-oil may be warmed and injected, and followed in half an hour by a soap-and-water enema.

Nutrient Enema.—This is given when a patient is taking insufficient food by the mouth, or when, from some cause or other, it is considered desirable to give the stomach a complete rest. Under such circumstances food is injected into the rectum.

The powers of digestion possessed by the rectum are naturally not very marked, since under normal conditions this is no part of its work, though it freely absorbs fluid. Any food, therefore, that forms part of a nutrient enema must be thoroughly digested before use. Milk should be peptonised or pancreatised for at least an hour at a temperature of 130° to 140° F. before it is injected into the bowel. At the end of that time, if it is not going to be at once used, it should not be boiled, but should be placed on ice till required. By doing this the peptonising process, which is temporarily stopped by the ice, will begin again when the enema is introduced into the rectum, whereas, if the milk is boiled, the peptonising substance is completely destroyed.

Further, in health the lower part of the rectum is empty, fæcal material collecting in the portion of bowel immediately above it, and only passing into it during

the act of defæcation. It follows, therefore, that we must be careful not to inject more than a small quantity into the bowel, otherwise we shall irritate it by distension, and so cause it to reject the fluid.

The size of the enema, together with the frequency of injection, will be determined by the medical officer in charge of the case. Four ounces every four hours is a usual quantity for an adult, half that quantity being used for children of five years. Peptonised milk is usually the chief constituent of these enemata.

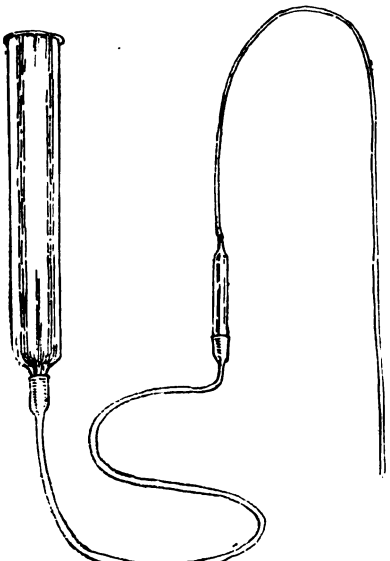

Fig. 5.—*Apparatus for giving a Nutrient Enema.*

The apparatus to be used should consist of a rubber catheter (No. 8), to which is attached a foot of rubber drainage tubing, into the other end of which is fixed a small glass funnel, or, better still, the barrel of a 2-ounce glass syringe, or the catheter and drainage tube may be joined by a couple of inches of fine glass tubing, such as is used for pipettes. The barrel of a glass syringe is preferable to a glass funnel, as being more easily fitted to the drainage tubing, and less likely to allow of the fluid being spilled during use.

This form of apparatus might very well be used for the giving of every sort of enema except the glycerine. *Nutrient enemata should never be given with a 4-ounce rubber ball syringe.* It is almost impossible to inject the fluid sufficiently slowly by this instrument, the hand becoming tired by the prolonged strain, or to avoid injecting air if less than 4 ounces is used. Besides, it is a difficult instrument to clean thoroughly. Indeed, it ought never to be used for any form of rectal injection.

Owing to the limited power of digestion possessed by the rectum, the whole of each enema is never absorbed; a certain amount of solid material is always left on the wall of the bowel. It is very essential that this should be removed, since, if left, it will hinder the absorption of the next enema; and, by undergoing decomposition, set up an irritable condition of the rectum. Patients who are being systematically fed by the bowel should therefore have a plain water enema once in each twenty-four hours. This alone, however, is not enough. Before each enema is given, the rectum should be gently washed out in the manner described below. This not only removes the remains of the previous injection, but freshens up the mucous membrane of the gut, and so predisposes it to absorb the food which immediately follows.

The patient being in the position already described, the nurse pours a small quantity of warm water or boracic lotion (temperature 95°) into the glass funnel till it appears at the eye of the catheter, thus expelling all air. She then nips the catheter between the thumb and forefinger of her right hand, so as to prevent any more fluid escaping, and having oiled it,

passes it carefully into the bowel for about 6 inches in a backward and upward direction. She then slowly runs in 6 to 8 ounces of the fluid (if the patient be an adult). Depressing the funnel below the level of the bed, before it is quite empty, just as in washing out a stomach, she lets the fluid run out again into a vessel which she has ready for it. This process she repeats three or four times, till the lotion comes back quite clear. She now withdraws the catheter about 4 inches, so as to be sure that no lotion has collected in the bowel below the eye of the instrument. Having made certain that the rectum is both clean and empty, she carefully passes the catheter in again till about 6 inches of it lie in the interior of the bowel, and then very slowly runs in the nutrient enema. This should be about 95° in temperature, and it should take at least 5 minutes to give 4 ounces. To ensure the fluid entering very gradually, the funnel should be raised but a very short distance off the bed.

Having completed the operation, the nurse slowly withdraws the tube, and, if the patient is a child, keeps a folded towel pressed against the anus and perinæum for a few minutes. This will help to counteract any tendency to reject the enema. In furtherance of this object, the patient should lie quietly on his left side for at least an hour after the injection. In cases where the bowel is irritable and tends to reject the enema, the lower end of the bed or cot should be well raised from the ground. Lifting it 2 or 3 inches by means of blocks is of very little use. It should be raised at least 1 foot, and can often be kept for many days in that position without any expression of discomfort on the part of the patient.

In very young children the same result may be accomplished by placing a pillow beneath the hips. By raising the lower end of the body in this way, the fluid is made to run higher up the bowel, and thus prevented from pressing upon the anal aperture. The addition of a small quantity of opium to an enema promotes its retention, but hinders absorption.

Sometimes large nutrient enemata, containing as much as a pint, are ordered. By giving three of these in the twenty-four hours the patient is afforded a much larger quantity of nourishment than by the method just described. They are, however, very seldom used, being difficult, and sometimes impossible, of administration, while the smaller enemata are quite efficient as a temporary resource, and much less likely to be rejected. Naturally, such a large quantity of fluid could not be accommodated within the rectum; if left there, it would be at once returned.

A stout rubber tube, such as is used for washing out the stomach, should be carefully passed for at least 10 inches into the rectum in a backward and upward direction. The great difficulty is to be sure that it is not curling upon itself within the bowel, instead of moving upwards. To obviate this as much as possible, the thick tube is used; otherwise, the enema is given as previously described, half an hour at least being expended on the operation. Before giving one of these large nutrient enemata, the end of the bed should be well raised, so that the fluid may find it less difficult to run up the bowel, or the buttocks may be supported on pillows. These large enemata may also be given as follows: An irrigator, sus-

pended above the bed, is connected by means of rubber tubing with a small catheter in the rectum. The tubing is compressed by a clip, so that fluid from the irrigator can only pass through it very slowly, and thus enter the rectum drop by drop, where it is absorbed before any quantity can accumulate.

Starch-and-Opium Enema.—This is given for the relief of pain, or to check excessive diarrhœa such as is sometimes present in enteric fever. For an adult 2 ounces, for a child 1 ounce, of thin starch, mixed with the prescribed amount of laudanum, is heated to a temperature of 95°, and slowly injected into the bowel by means of a glass syringe and some drainage tube, or it may be run in through the apparatus used for nutrient enemata.

Besides those which have been described, various other forms of enema are sometimes ordered to stimulate the patient, destroy worms, or check diarrhœa. These need no special description, since the constituents and exact quantities to be used would always be ordered by the medical attendant. They should all be given by the nutrient-enema apparatus.

Washing out the Bowel in Children for Diarrhœa.—This is a most useful, and frequently very efficacious, method of treating acute diarrhœa in young children. A nurse may be told to perform this operation, and she would be supposed to know how it was done. Plain water at a temperature of 95° is often used, or it may have a teaspoonful of common salt, or some emollient such as starch, added to it. In chronic diarrhœa, astringents, such as tannin and sulphate of zinc, are sometimes used.

To do any good the large intestine above the rectum must be washed out, so that a much larger quantity of fluid will be used than when giving a soap-and-water enema to a child of this age. For a child of two years at least a pint should be run in by means of the nutrient-enema apparatus. One nurse should inject the water, while a second passes her left hand under the child's legs and raises its buttocks well off the bed, while with her right hand she kneads the left-hand side of the abdomen in an *upward* direction, so as to help the fluid up the bowel. The catheter should be passed for at least 4 inches into the rectum, and the fluid run in very slowly to avoid giving pain.

Passing the Long Rectal Tube.—This is used simply for the relief of abdominal distension. This condition being due to an accumulation of gas in the intestine which the bowel is too weak to expel, a tube is passed in through which it can escape. A stout rubber tube, such as is used for the giving of large nutrient enemata, is passed into the rectum for about 10 inches, or until gas escapes freely. This method of relieving abdominal distension is by no means invariably successful.

Suppositories are solid preparations of a conical shape, and of varying size, according to their contents. They are usually made of cacao butter, with which is incorporated the drug desired to be used. This is most commonly morphia. Others contain digested meat, and are called "zyminised" suppositories. The cacao butter melts readily in the rectum, and then the drug which it contains is absorbed.

Having placed the patient on his left side, the nurse oils the suppository, and then slowly passes it into the rectum. It is important that it should really enter the cavity of the bowel, and not remain gripped by the anal sphincter. A towel pressed against the anus and perinæum for two or three minutes will obviate any tendency to ejection.

CHAPTER XIII.

MEDICINES AND THEIR ADMINISTRATION.

DRUGS may be introduced into the system in five different ways. They may be swallowed, inhaled, injected under the skin, rubbed into the skin, or injected into the rectum. Whichever way is chosen, the drug is, as a rule, first taken into the blood, and by it carried to the organ which it is intended to affect. Some purgatives, for instance, are absorbed either from the stomach or intestine into the blood, by which they are carried to the muscle in the wall of the large intestine, which they stimulate to contract more forcibly and so move the contents of the bowel onwards. Other drugs, however, act directly upon the mucous membrane of the intestinal canal.

1. **By the Mouth.**—The great majority of medicines are given by the mouth, and hence are absorbed into the blood from the stomach or intestines. Drugs given in this way may be administered in the form of liquids, pills, powders, or in capsules.

(*a*) *Liquids.*—Except in the case of certain oils, liquid preparations of drugs—*i.e.*, solutions of them or their

active principles — are combined to form mixtures, which may contain one drug or half-a-dozen.

Before giving a dose of a mixture, *the nurse should never omit to read the label*, however confident she may be that she has got the right bottle. Even if there is only that one bottle in the room, she should still do so, that there may be no risk of the habit being broken. Nurses when they first begin to administer medicines are most anxiously careful; but, as time goes on, familiarity breeds contempt in some, and the fear of making a mistake gradually loses its hold on them. They become too confident, and then a little careless, until one day they do make a mistake, the consequences of which may be very serious.

Having read the label and shaken the bottle, the exact dose is poured into a graduated medicine-glass. It must never be guessed, and spoons are not reliable measures. When a certain number of drops are to be given, a minim measure should, if possible, always be used, since drops vary very much in size with the character of the fluid and the shape of the bottle—*e.g.*, a drop of glycerine is much larger than a drop of water. If one or two drops of a medicine are ordered, a safe plan is to measure out ten drops, and then add enough water to bring it up to five drachms. Each drachm of this mixture will contain two drops of the medicine. While pouring out the medicine, the bottle should be held with the label uppermost, that this may not be soiled if any drops should run down the side.

If the medicine is very unpalatable, sucking a piece of ice or a peppermint drop beforehand will partially get over the difficulty, since they numb the nerves of

taste in the mouth; or the nose may be pinched while the dose is being swallowed.

Castor and cod-liver oils may be given to adults in the following way, if they are private patients, and their medicines have to be made as nice as possible for them. A teaspoonful of sherry, or a small quantity of lemon-juice, is poured into a wine-glass, which is then tilted, so that the wine or lemon-juice runs all round it and hence prevents the oil sticking to the glass. The oil is then poured in carefully, so that the edges of the glass are not touched by it, and on it is placed another teaspoonful of sherry or more lemon-juice. For children the oil should be placed in a bottle with an ounce of milk and a pinch of sugar, the mixture being heated and then well shaken. As a result, the oil mixes intimately with the milk, and is taken without difficulty.

(*b*) *Pills* contain drugs in a solid form. When they reach the stomach, they break up and are absorbed. Sometimes it is desired that they should not break up until they reach the intestine, and they are therefore coated with a special material which the gastric juice is not able to dissolve.

There are two objections to the use of pills. In the first place, unless they have been recently made they become so hard and dry that sometimes they pass entire through the stomach and intestines, and appear in the stools. For this a nurse should always be on the watch, and never forget to report the occurrence to the medical attendant. Secondly, some people cannot swallow a pill, and the smaller it is the less likely are they to be able to do so. Even after a tumbler of water has been drunk, it still

remains at the back of the throat. This difficulty is frequently overcome by eating a mouthful of bread, which sweeps the pill down with it.

As a last resort, the pill may be crushed or cut into small pieces. By doing this it is converted into a coarse powder, which any one can swallow with the aid of a little water.

(*c*) *Powders.*—These should be shaken on to the back of the tongue, and then washed down with a drink of some fluid. If the powder has a very disagreeable taste, it may be given in a capsule, or wrapped up in a rice-paper wafer. This is first moistened and then folded over the powder, which is dropped on it. This rather uncomfortable-looking bolus, with the assistance of a drink of water, is easily swallowed.

(*d*) *Capsules* are small pear-shaped receptacles made of gelatine, which are sealed up after having a dose of the drug placed in them. They are easily swallowed, and the gelatine, like the rice-paper wafer, is at once dissolved by the gastric juice.

In addition to the above, drugs are compressed into "tabloids," and can also be taken in the form of "palatinoids," a recent and very handy invention for those who cannot swallow pills. They are larger and flatter than pills, and are said to at once open when they reach the stomach.

When to give Medicines.—This is a matter which is, of course, hardly ever left to the discretion of the nurse, full directions being usually given as to the time of administration of each dose. From this time a nurse should never vary, but always be punctual to the minute. If a medicine is ordered for 8 P.M. it is intended to be given at that hour, and not at ten

minutes to, or a quarter-past. Under this heading it is proposed to explain why particular medicines should be given at a particular time—*i.e.*, the reason for the doctor's directions.

Drugs, such as cod-liver oil, which might possibly cause nausea are given shortly after a meal, as the stomach, being busy with the food, is then less likely to take offence at them.

Alkaline mixtures are usually given a quarter of an hour before food. If taken soon after a meal, they neutralise some of the acid gastric juice, and so tend to interfere with the process of digestion. Taken on an empty stomach, they are very quickly absorbed into the circulation. Acid mixtures are best taken shortly after a meal.

Purgatives are given so that they may stimulate the bowel about the time when an action should normally take place—viz., after breakfast. Thus pills, which are slow to act, are administered at bed-time; while a seidlitz powder, or mineral water, is best taken half an hour before breakfast, as the stomach and intestine being empty at that time, it is quickly absorbed, and rapidly produces an action of the bowels.

Drugs which have for their object the killing of intestinal worms should always be given when the digestive tract is as free as possible from food, so that the parasites may not be protected by it against the action of the medicine. They are, therefore, usually administered late at night or early in the morning, food being withheld for a few hours previous to the draught, and also subsequently.

A medicine that is ordered to be taken before meals

should be given a quarter of an hour before food; one that is ordered after meals, immediately the food is finished.

A nurse ought never to give a double dose of medicine at one hour, because she had forgotten the previous dose when the time for it came round. After each dose of medicine the measure should always be washed.

2. **By the Lungs.**—Given in this way drugs are inhaled—*i.e.*, drawn with the air at each inspiration into the lungs, where they settle upon the lining membrane of the air sacs and bronchial tubes, from which they are absorbed by the blood-vessels. Medicines which are inhaled are usually intended to act only upon the lungs, and are, therefore, almost entirely reserved for cases in which these organs are diseased. Inhalations are also used for sore throat, and when the larynx is inflamed. They are given in one of the following ways:—

(*a*) The drug is dropped upon a piece of sponge, wool, or lint, which is placed in a wire respirator to be worn by the patient over his mouth.

(*b*) The drug is placed in an earthenware inhaler, together with a pint of water at a temperature of 150° F. The patient places his lips to the glass mouthpiece, and, breathing only through the mouth, draws into his lungs at each inspiration the vapour, and with it the essence of the drug.

Or the hot water and drug may be placed in a vessel with a wider opening, such as a basin or jug, so that the patient may inhale through the nose as well as the mouth. This is a very useful method in the treatment of an ordinary cold in the head.

(*c*) The drug may be administered by means of a Siegel's spray, which throws a fine cloud of steam and the medicated solution upon the patient's mouth, which he consequently breathes in at each inspiration. Care must be taken that the apparatus is working properly, or a jet of boiling water may spout on to the patient's face and scald him.

Lastly, certain drugs, such as chloroform, ether, &c., are inhaled for the purpose of producing anæsthesia.

3. **Hypodermic Injections.**—By this method the drug to be administered is injected under the skin. "Under the skin" is the meaning of both "hypodermic" and "subcutaneous." Absorption into the circulation is very much more rapid by this way than by either of the others; the drug, if it is going to produce any effect, doing so within from one to five minutes of the time of injection. It is also a much more certain method than any of the others, since we know that the whole of the dose will be absorbed, which we cannot be sure is the case when it is swallowed and mixed in the stomach with the contents of that organ. Being such a potent method, it is, as a rule, used only in cases of emergency, when we wish at once to relieve pain, induce vomiting or sweating, or stimulate the heart.

All nurses should learn the proper use of the hypodermic syringe, since at any time they may be called upon to give an injection; though this is seldom done unless the medical man is absolutely satisfied of their ability to do so, for any mistake with such concentrated solutions as are used for this purpose might have the most serious consequences.

Having first tried the syringe, to see that the needle

is not blocked, and that the piston does not allow fluid to escape behind it when the opening in the nozzle of the instrument is plugged with the finger, the nurse proceeds to fill it with the solution poured into a minim measure which has first been carefully cleansed. The needle should not be on the syringe while this is being done; otherwise, if the piston works stiffly, it may suddenly slip, and, taking the nurse unawares, cause the point of the needle to be damaged against the bottom of the glass. Now, placing the needle on the nozzle of the instrument, it should be directed upwards, and the piston slowly pressed home, until a

Fig. 6.—*Hypodermic Syringe.*

drop of fluid escapes from the needle, which shows that all air has been expelled from the syringe.

The next step is to mark off the dose to be given. This is best and most safely done by means of a regulator, which moves up and down the piston-rod, on which are marked tiny divisions, each of which represents a minim. If five minims are to be given, the regulator is screwed up until it is five of these divisions distant from the barrel of the syringe, as shown in fig. 6. Now, when the piston is driven home, as soon as those five minims have been injected, the regulator comes to a stop against the barrel, and prevents any more being given. In the absence of a regulator, the syringe must be emptied until no more than the dose ordered remains in it, which is then injected.

In giving the injection, a fold of skin is raised between the thumb and forefinger of the left hand, and the barrel of the syringe being grasped lightly by the thumb and two first fingers of the right hand, the point of the needle is quickly pushed in beneath the skin in a horizontal direction to a distance of half an inch, and the injection given. As the needle is withdrawn, the thumb and forefinger of the left hand should lightly but firmly grasp the opening in the skin, to prevent the possibility of fluid escaping. When the needle has been withdrawn, the little swelling should be gently rubbed in the upward direction, to promote rapidity of absorption. Some physicians prefer that the needle should be passed straight downwards into the limb, so that the injection is made, not beneath the skin, but into a muscle. This is said to be less painful, and also less likely to produce an abscess. If this is done, the skin is not raised, but stretched taut by the left hand, so that the needle may more easily enter.

The needle should not be pushed in with a sudden stab, as that may startle the patient, and lead to its being broken. It should be passed in quickly but quietly, for if it has a sharp point, there is practically no pain caused by this part of the operation. If the patient is a child, an assistant should hold the limb.

Injections are usually made into the outside of the arm or thigh, the latter being chosen if the patient is a woman, in case any scarring should result. Great care must be taken that the point of the needle does not enter a vein, as if that happened, the drug, being carried straight to the heart, might produce very alarming symptoms.

After use, the syringe should be thoroughly cleansed by filling and emptying it several times with cold water. It is important that no water should be left in the needle, otherwise the inside of it becomes rusty, and, finally, blocked. It is no use blowing through the needle with the mouth, as nurses so often do, as that is quite inefficient, besides being a by no means cleanly proceeding. The only certain method is to fill the syringe three or four times with air, and force that through the needle, and afterwards to draw a little absolute alcohol through it by means of the syringe. After this, the wire must always be replaced in the needle.

If considered desirable, the needle can be easily sterilised before each injection, by boiling it over a spirit-lamp in a table-spoon or test-tube.

4. **Inunction,** which means the rubbing of an ointment into the skin. The portion of skin to be treated should first be washed with soap and warm water, and carefully dried. This is done with a view to stimulating the circulation in the skin, so that it may the more quickly absorb the medicament. This method of introducing drugs into the system is practically reserved for the administration of mercury in cases of syphilis, though sometimes cod-liver oil is given in this way to very emaciated patients.

Nurses must remember, when practising inunction, that the ointment is to be rubbed *into* the skin, and not left on it, the part being thoroughly massaged by means of the palm and finger-tips. It should take from twenty minutes to half an hour to rub in the usual dose of mercurial ointment. The insides of the arms and thighs, and the sides of the chest and abdo-

men, are the best sites for inunction. The same place should not be used on successive days, otherwise there is a risk of the skin becoming inflamed. Inunction is usually performed at bedtime. The patient should wear a flannel night-gown, and take a warm bath in the morning.

5. **Rectal Medication.**—Drugs may be introduced into the rectum in either the liquid or the solid form. They are given in this way when the patient is unconscious, or vomiting, or for the relief of diarrhœa or rectal pain, or for the purpose of stimulating a patient who is collapsed after operation. Liquid preparations should be run in by means of the apparatus recommended for the administration of nutrient enemata. Opium is the drug that is most commonly administered in this way in combination with starch. Suppositories are small cone-shaped bodies which contain drugs in a solid form. They are usually made of cacao butter, which melts at once from the heat of the rectum. Their method of administration has been already described.

Drugs which may produce Symptoms of Poisoning.—Nurses should know something about the action of the more important drugs, since certain of them at times produce symptoms showing that the patient is being injuriously affected by their administration, which should therefore be discontinued. A nurse should be able to recognise these symptoms, so that she may at once report them to the medical attendant. She should always be on the look-out for them, since it by no means follows that they will not appear because small doses are being taken. Some people, owing to their extreme susceptibility to a drug, are

at once poisoned by it in a way that could not possibly have been anticipated.

Again, certain drugs, of which digitalis is the best example, after being taken for some time, all at once produce symptoms of poisoning. They are said to have a "cumulative" action — *i. e.*, they gradually accumulate in the system until one day a certain limit is reached, and symptoms are suddenly produced. On the other hand, some drugs, of which opium is the best example, after a time gradually lose their effect, so that the dose has to be correspondingly increased, till at last the patient tolerates doses which it would have been highly dangerous to give him when he first began to take the drug.

In the following list the symptoms given are not those which would follow a poisonous overdose of each drug, but only such as might arise during its medicinal administration :—

Alcohol.—Reference is here made only to the use of alcohol as a stimulant in cases of illness, such as enteric fever. It is especially given in cases of low muttering delirium, with a dry tongue and rapid feeble pulse; though very frequently it is administered for the last-named condition only, that being the chief sign of a failing heart. If restlessness and delirium become more marked, the tongue more dry, and the pulse more rapid in a patient who is not used to alcohol, such as a woman or a child, there is a possibility that the drug is to a certain extent responsible for these symptoms. A nurse should therefore carefully note its effect upon them.

Antifebrin and Antipyrin, when given even in small doses, produce in some people symptoms of collapse, as

shown by palpitation and faintness. Such symptoms should always be reported by the nurse to the medical attendant before giving another dose of the drug.

Arsenic.—Danger from the use of arsenic most often arises in cases of St Vitus's dance, for which it is sometimes given in much larger doses than for any other disease. Under these circumstances arsenic may injuriously affect the nerves of the arms and legs, causing those members to become paralysed. Any obvious increase in weakness of the limbs should be carefully looked for and reported. Arsenic may also produce vomiting and pain in the epigastrium.

Bromide of Potassium, when given for a lengthened period, as is usually done in cases of epilepsy, tends to produce muscular weakness and nervous depression, while sometimes a pustular rash appears on the face and trunk.

Belladonna and Atropine, which is its active principle, produce in people who are very susceptible to their influence a dry throat, dilation of the pupils, and sometimes a red rash like that of scarlet fever. In more severe cases delirium and convulsions supervene. This indicates an extremely dangerous state of affairs.

Carbolic Acid.—The first symptom of poisoning by this drug is a dark olive-green colour of the urine.

Chloral in some people dangerously depresses the action of the heart, and slows the respiration. When the drug is being continuously given, as is sometimes done in chorea and tetanus, the nurse should most carefully watch the pulse and breathing.

Digitalis, after being administered for some time, occasionally produces sudden symptoms of depression

and faintness, accompanied by vomiting and slowing of the pulse. This condition is more likely to come on when the patient is sitting up. Any one who is taking large doses of digitalis should therefore be kept in the recumbent or semi-recumbent position.

Iodide of Potassium in some people very readily produces running from the eyes and nose, and less often a rash on the face, trunk, and limbs.

Mercury after a time tends to produce swelling and inflammation of the gums, with loosening of the teeth and fœtor of the breath. With this there is a metallic taste in the mouth and an increased flow of saliva. A nurse should most carefully watch for these symptoms, and without fail report any of them, whenever this drug is being continuously used.

Nux Vomica and Strychnine.—Strychnine is the active principle or essence of nux vomica, just as morphia is of opium. After being taken for some time, these drugs in some patients produce muscular twitching, which is an indication for discontinuing the medicine.

Opium and Morphia. — Very young children are most easily poisoned by even a very small dose of these drugs. Minute contraction of the pupils, and great difficulty in rousing the child, show that it is being dangerously affected by the opium. The same symptoms may occur in adults whose kidneys are diseased, or who are in the later stages of acute pneumonia.

Quinine in some people readily produces headache, deafness, and singing in the ears, while more rarely a very irritable rash follows its administration.

Sodium Salicylate frequently produces transient deafness and singing in the ears. These symptoms, though trying to the patient, are not necessarily an indication that the drug should be discontinued.

Weights and Measures.—A nurse should know the tables of weights and measures ordinarily in use.

Weights—

20 grains (gr. xx)	= 1 scruple (℈i)
437½ grains	= 1 ounce (℥i)
16 ounces	= 1 pound (℔i)

Fluid Measures—

60 minims (mlx)	= 1 fluid drachm (ʒi)
8 drachms	= 1 ounce (℥i)
20 ounces	= 1 pint (Oi)
8 pints	= 1 gallon (Ci)

Approximate Measures—

A teaspoon holds about	1 fluid drachm		
A dessertspoon	„	2 fluid drachms	
A tablespoon	„	4 „	or ½-ounce
A wine-glass	„	1½ to 2 ounces	
A teacup	„	5 „	
A breakfast-cup	„	8 „	

Some nurses have great difficulty in working out the dose of a drug which is contained in solution, when so many grains of the drug are ordered instead of so much of the solution.

A mixture, for instance, contains 30 grains of chloral in each ounce, and the patient is ordered to have 10 grains given him, if he does not sleep. How much of the solution ought she to give him? Now, 10 is the

third part of 30; to get 10 grains he must, therefore, have the third part of an ounce of the mixture—*i.e.*, the third part of 8 drachms—viz., $2\frac{2}{3}$ drachms, or 2 drachms and 40 minims.

Again, the mixture is said to contain one grain of chloral in each 8 minims—*i.e.*, the patient must take 8 minims to get one grain. If he is ordered 15 grains, the nurse must give him 8 times 15—*i.e.*, 120 minims of the mixture; if he is ordered 10 grains, 8 times 10—*i.e.*, 80 minims; in other words, she must multiply the number of grains ordered by the number of minims in which each grain is dissolved.

A 5 per cent (5%) solution is one that contains 5 grains of the drug in every 100 minims of the solution, a 10 per cent one that contains 10 grains in 100. 20 per cent is therefore twice as strong as a 10 per cent, and 10 per cent twice as strong as a 5 per cent. To convert a 10 per cent solution into a 5 per cent it must, therefore, be mixed with an equal quantity of water or other diluent.

Explaining such simple calculations may seem absurd to some people, but everyday experience shows that it is by no means uncalled for.

All medicines should be kept in a cupboard, the key of which is in the possession of the sister or head nurse of the ward. All poisons should be carefully labelled. The liniments and lotions should stand on a shelf by themselves, poisons like morphia and strychnine on another shelf, while a third is occupied by the ordinary everyday medicines. If this rule is always observed, and the cupboard kept constantly locked, there is no excuse for administering a poison by mistake.

In conclusion, we would most strongly urge nurses

never to forget the limits of their profession, when asked, as occasionally they are sure to be asked, what medicine they would advise. In such a case they should always refer the questioner to the medical attendant. Let them never forget that, except in an extreme emergency, no nurse should ever take upon herself to make a diagnosis or to prescribe.

CHAPTER XIV.

THE NURSING AND FEEDING OF SICK CHILDREN.

Nursing of Sick Children.—This is in every way more difficult than the nursing of adults. A young child cannot tell its nurse what is the matter. She must, by keen observation, be able to interpret the meaning of its different symptoms, without having them put into words, as would be done by an older patient. Frequently, too, there is difficulty in getting a child to do what its nurse wants, unless she has been successful in gaining its confidence, to accomplish which she will often require much tact and patience. These difficulties are in a measure overcome by that innate sympathy and liking which almost all women feel towards children, which help them to recognise a child's wants by its looks and inarticulate mutterings far more quickly than a man could.

Often a nurse's patience is strained almost to the breaking point by a child's wilfulness, but she must never give way. Reprove it in a kindly manner of course she may, but she must never scold or threaten a child; while if she should so far forget herself as to

raise her hand against it, she should certainly be asked to leave.

One thing which a nurse should always bear in mind is that a very trifling matter, such as a slight chill or a little indigestion, may produce the most alarming symptoms in a child, symptoms that the same causes would be powerless to produce in an adult. On the other hand, a child, if it is much exhausted by disease or want of food, may present hardly any symptoms at all, though suffering from an acute illness such as pneumonia. In the first instance the indications are more urgent than they would be in the case of an adult; in the second instance the opposite holds good. This apparent contradiction is due to the extremely sensitive and excitable character of a healthy child's nervous system, in consequence of which it is easily upset by trifling ailments, so that it produces exaggerated symptoms; while, on the other hand, it is more quickly exhausted by illness and want of food, so that it then responds only feebly to the stimulus of disease. A nurse must therefore be on her guard against underrating the importance of an illness occurring in one of these weakened children, because the symptoms are not so urgent as she has been accustomed to see in adults. Rather, the danger is greater, the lack of symptoms indicating a serious defect in vitality. It is on this account most essential that a nurse should exercise her powers of observation to the utmost, so that she may gain all the information possible from a child's expression, its cry and posture.

Observation of Patient—

(*a*) *Expression.*—If a child is in pain, it will always

show it in its face. Sometimes it is possible to tell from the expression in which part of the body the pain is situated. According to Dr Eustace Smith, "pain in the head is indicated by a contraction of the brows; in the chest by a sharpness of the nostrils; and in the belly by a drawing up of the upper lip." Exhaustion, which sometimes comes on very rapidly, especially after acute diarrhœa, is shown by depression of the anterior fontanelle in infants, by pallor of the face with lividity of the lips, and by sinking in of the eyes with incomplete closure of the lids during sleep, so that the white of the lower half of the eyeball is seen. Exhaustion, when extreme, is a symptom of great danger, and one that must be carefully watched for by the nurse. Stimulants internally, and immersion for three or four minutes in a hot mustard bath, are the most efficient means of overcoming this condition.

(*b*) *Cry.*—The character of a young child's cry often gives as much information as the articulate speech of an adult. A child that is hungry gives vent to a prolonged passionate cry, after which it tries to extract nourishment from its fingers or thumbs, and failing to do so, cries again. With pain in the abdomen, we get a loud paroxysmal cry, accompanied by a drawing up of the legs; with exhaustion a low whine. With meningitis we get at intervals sharp piercing screams, the child between whiles lying quietly on its back. When there is inflammation of the larynx, the cry is hoarse and whispering. With inflammation of the lungs a child as a rule cries but little, because of the pain which a deep breath causes it.

(*c*) *Posture in Bed.*—This should be noted by the

nurse, as sometimes conveying a certain amount of information. Healthy children, when sleeping, commonly lie on their sides; when seriously ill or suffering from exhaustion, on the back with the face directed upwards. Drawing of the head backwards may be due to meningitis. Abdominal pain will cause a child to draw its legs up. This posture soon after a meal is a sure indication that food is the cause of the trouble.

To see if a child is losing flesh the inner sides of its thighs should be examined. Acute diarrhœa will quickly make these parts soft and flabby to the touch, with wrinkling of the skin.

Hygiene.—A nurse must never forget that cleanliness, warmth, and fresh air are prime factors in the successful nursing of sick children. Another factor of great importance—viz., a sufficient supply of good food—will be treated of shortly.

All soiled linen should be removed at once. In an infants' ward, the sister or head nurse should frequently go round the cots to see if any child requires changing. A wet diaper not only chills an infant and irritates the skin, but it also lessens the purity of the air the patient is breathing. When removing a stool, the nurse should carefully note anything unusual about it, such as the undigested curd of milk, mucus, or an abnormal colour, and report the same to the medical attendant.

Every infant, unless too ill, should have a warm bath (95° F.) each day. About two hours after breakfast is the best time to give it. The child should be kept in the water from three to five minutes, and then be thoroughly dried with a soft towel, special

attention being paid to such parts as the groins, armpits, and backs of the ears.

Warmth and fresh air are both indispensable, yet by many nurses they are considered to be antagonistic, so that one is provided at the expense of the other. To keep a child warm, the windows are closed, that there may be no risk of anything in the nature of a draught. This is a great mistake. Young children, it is true, need more warmth than adults; but at the same time they have a greater need of fresh air, both on account of their age and also their habits. To keep a child warm, the windows must not be closed, unless the temperature of the room persists in falling below 60° F., but warmth must be provided by means of flannel night-gowns which completely cover the extremities, so that if the child is restless and kicks off its bed-clothes it will still be protected from cold. A child should not be smothered in bed-clothes, otherwise it will get too hot and throw them off, with the risk of a chill.

Cold hands and feet are harmful to a young child, for they mean that blood which should be circulating in the skin has been driven inwards, so that the internal organs become congested or over-full of blood. This causes them to work badly, and predisposes to inflammation, so that with cold hands and feet you are more likely to have pain after food, diarrhœa, and bronchitis.

Sunlight should never be kept away from a child unless it is shining in its face, in which case the blind should be *temporarily* lowered. Children, like everything else that is growing, are the better for sunlight.

Feeding.—When an infant is being bottle-fed, there are several points to which a nurse must direct her

attention. In the first place, it is most essential that the bottle should be quite clean and free from any trace of decomposing curd. This can only be attained by using at least two bottles; seeing that directly the child has finished its meal the bottle is thoroughly cleansed with soda and hot water, especial care being paid to the teat, and that it is then put into a solution of boracic acid or salicylate of soda until it is again required. In addition to this, the bottles and teats should be boiled at least once a-day. A nurse must never give a child more than it is ordered, because she thinks it unsatisfied and still hungry. A child that is ill will often cry between its meals because it is thirsty. This is easily remedied by a teaspoonful or two of cold water. The milk, unless otherwise directed, should be given at a temperature of about 95° F.

As regards the manner of feeding, the child must not be left alone to bolt its food. One great advantage of the boat-shaped feeding-bottle is that the nurse is intended to hold it in her hand while the child is feeding, which, however, many fail to do. The child should be slightly propped up; it is more likely to vomit, if allowed to lie flat on its back when sucking. The nurse should seat herself beside it, and hold the bottle in her hand; or, if the child is well, take it in her lap, and support its head on her arm. By holding the bottle, she is able to see that the child does not take its meal too quickly; while, as the bottle gradually becomes emptied, she is able to tilt it up, thus keeping the end of the teat under the milk, so that the child does not draw air into its stomach. It shows bad management when an infant is left sucking away at a bottle which is lying in such a position that the

child cannot get at the milk, but is filling itself with air. It is almost sure to have pain and possibly vomiting as the result. After a child has finished its meal, the nurse should note whether it suffers from discomfort or flatulence; whether its abdomen becomes unduly distended, and whether it seems to be satisfied. If it vomits, the quantity brought up should be noted, together with the length of time after the meal.

A nurse should never, when feeding a young child, try to make it eat by first putting the spoon into her own mouth. She should never blow upon the food to cool it; the breath is often impure, and may make the food injurious to the child.

As regards the feeding of sick children who have passed the stage of infancy, there is little to be said. The great thing is to get them to take their food regularly and in proper quantities. This is often a very difficult matter, since it is impossible to reason with very young children, and at times they will not be coaxed. A quiet insistence will often overcome their obstinacy, but threats and anything in the nature of force, except by the doctor's orders, must never be used. It is most wrong for a nurse to hold a sick child's head down on the pillow, while she tries to force the food into its mouth. Moreover, the child in its struggling is liable to draw the food through the larynx into its lungs, and so set up a pneumonia which will in all probability prove fatal. To avoid any such risk as this, together with the wasting of the child's strength that results from its objection to being fed, the food is introduced into the patient's stomach by means of a tube.

Forced Feeding.—For the forced feeding of sick children the apparatus most commonly used is an ordinary soft rubber catheter (about No. 6 size), to which is attached a piece of drainage tubing, a short piece of glass tubing being often used to connect the two. To the other end of the drainage tubing may be fixed either a glass funnel or the barrel of a glass syringe (see fig. 5, p. 174). The latter is decidedly preferable, for the reason that fluid is much less likely to be spilt than it is out of a funnel, if the child struggles. Also, when the tube gets blocked, as sometimes happens, you can introduce the piston and force the fluid down the barrel. Instead of the rubber catheter, one made of silk web, or a special black tube with a funnel-shaped expansion at one end, can be used. The latter needs softening in warm water before it is passed. It is much more expensive, and easily spoilt, owing to the readiness with which these tubes crack. They can, however, owing to their comparative stiffness, sometimes be passed when the rubber tube persists in forming coils at the back of the mouth instead of travelling down the œsophagus. The milk should be poured into the funnel-shaped expansion from a feeder with a spout.

The following are the principal methods of forced feeding:—

(*a*) *The Food is injected into the Mouth.*—This is generally used for very young infants who refuse the bottle because of the pain which sucking causes them. Thrush, or any form of stomatitis, might produce this condition. It is also used after the operation for harelip has been performed. A couple

of inches of drainage tubing are fixed on to the nozzle of a glass syringe, and the milk is slowly and intermittently injected, the child, which is in the recumbent position, being given plenty of time to swallow. The patient's head is held on one side, so that the fluid may run round the side of the mouth, and thus have a better chance of escaping the larynx. Children of this age do not struggle, but lie with the mouth open, trying to cry between each mouthful, so that the operation is easy of performance.

(*b*) *The Food is injected into the Nose.*—This may be used for the last class of cases, or for older children who would actively object to the tube in the mouth. Food is sometimes administered in this manner after tracheotomy has been performed. The apparatus described in the last paragraph is used, and the end of the drainage tube being placed just within the nostril, the syringe is slowly emptied. The milk runs along the floor of the nose, and so into the pharynx, when it is swallowed. For the carrying out of this method of feeding, it is of course essential that the nasal passages should be clear, and not plugged with thick mucus.

(*c*) *A Tube is passed through the Nose into the Stomach.*—This is the most generally useful method of forced feeding. It is frequently ordered in certain forms of paralysis after diphtheria, when the muscles of the pharynx are affected, so that the power of swallowing is partially or entirely lost. The child being in the recumbent position, and, if there is only one nurse to do the feeding, wrapped up in a draw-sheet, the end of the tube is vaselined, or dipped in olive-oil, and passed along the floor of the nose into

the pharynx, and on into the stomach. The nurse must be careful, when introducing the tube into the nostril, to point it straight backwards, and not direct it upwards; otherwise, it will at once catch against the roof of the nose and come to a full stop. This difficulty is much less likely to happen with the rubber catheter than with the stiffer black tube, for the former is so flexible that it easily glides off an obstruction and makes its way onwards. It finds its own way through the nose, while the other is more capable of direction, and hence also of misdirection. This flexibility of the catheter leads it sometimes to coil up at the back of the mouth, an occurrence for which a nurse must always be on the look-out. The tube having gone down, the next question which the beginner anxiously asks herself is, "Is it in the gullet or the windpipe?" The latter lying immediately in front of the former (see fig. 7), it would at first sight appear very easy for the tube to get into the wrong passage. As a matter of fact this does not often happen, though a nurse, when first performing the operation, often thinks that this is the case, because she hears air coming from the tube; that she not unnaturally thinks must be from the lungs, whereas it is only gas escaping from the stomach. If air bubbles up in a steady stream during both expiration and inspiration, and if pressure with the hand on the epigastrium forces out more air, the tube must be in the stomach. If the tube had passed through the larynx, the child would be in a condition of urgent dyspnœa. Moreover, the tube would very soon come to a standstill, since the windpipe is much shorter than the gullet. If, therefore, 12 inches of tubing have passed

through the nose without meeting with any obstruction, and the child is breathing quietly, the end of the catheter, provided it is not curled up in the

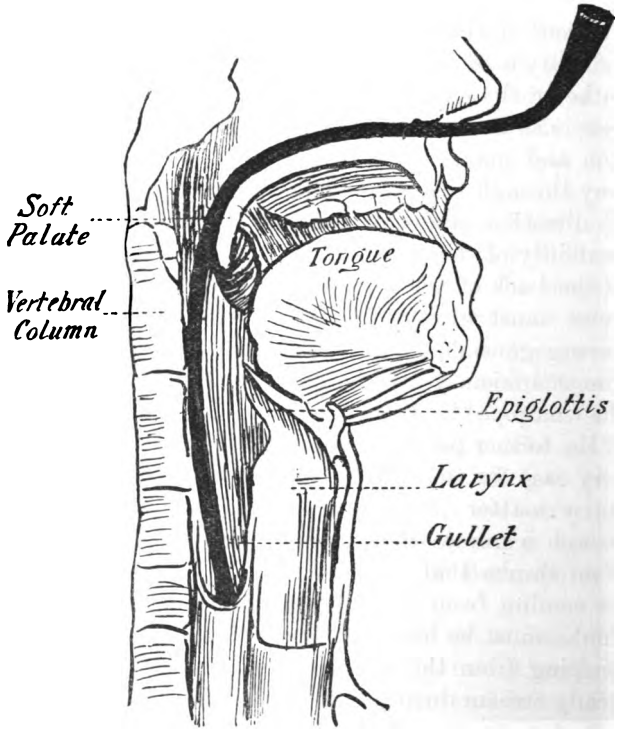

Fig. 7.—*Section through head and neck, showing a black nasal tube in position. More of the tube should be outside the nose.*

mouth, is certainly in the stomach. If one of the black tubes is being used, about one-third of it should be left outside the nose.

Having passed the tube, it is well to wait for a few seconds before pouring in any food, to allow the child to quiet down, if it has been coughing or struggling. It happens not infrequently at some stage in the feeding that the tube gets blocked, and the fluid consequently ceases to run down it. This little difficulty is easily surmounted by passing the thumb and forefinger down the drainage tubing, squeezing it firmly while doing so, or if this fails, introducing the piston into the barrel of the syringe and forcing it downwards. If a black tube is being used it is safer to strain the food through muslin, and thus avoid the risk of a block.

If the child coughs during the operation, the drainage tube should be nipped between two fingers, or the thumb placed over the end of the black tube, to prevent the food being forced out. The milk must be poured in in a continuous and steady stream. One lot should not be allowed to completely disappear from sight before more is added, because each time that is done air is forced into the child's stomach, which may lead to pain or even produce vomiting.

At the end of the operation the tube should be withdrawn steadily and not with a jerk, the thumb being pressed over the opening of the black tube, or, if a catheter is used, the drainage tube firmly caught between the thumb and finger. The object of this precaution is to prevent food escaping from the tube as the end of it is withdrawn.

(*d*) *A Tube is passed through the Mouth into the Stomach.* — This is not so easy as passing a tube through the nose; it is more likely to provoke vomiting, and it requires the help of an assistant to hold a cork

or a gag between the child's teeth, to prevent it biting the tube. As a rule, this method is used when the nasal tube has failed to pass, owing to complete obstruction of the nasal passages, or when the catheter, in exceptional cases, persists in entering the windpipe instead of the gullet. This operation is usually performed by a medical man, though nurses are sometimes called upon to carry it out.

The child having been wrapped in a sheet, the assistant takes her place on the left side of the bed. With her left hand she holds the gag in position, so that the child's mouth is kept widely open, while with the right she makes firm pressure on the forehead to keep its head steady. The other nurse takes the tube in her right hand, and dips the end of it in olive-oil. She then places the first two fingers of her left hand well on to the back of the patient's tongue, pressing that organ forwards, while at the same time she rapidly passes the tube towards the back of the throat along the groove between her two fingers. Speed is very essential in these cases, as any fumbling about with the tube at the back of the throat will almost certainly result in the patient retching. A larger tube should be used than for nasal feeding, its increased size making it stiffer, and consequently easier to pass.

CHAPTER XV.

CONTAGION AND DISINFECTION.

In this chapter it is proposed to consider the general principles underlying the management of infectious diseases. The individual fevers and their nursing will be discussed in the next volume.

It is of great importance that a nurse should appreciate the extent of her responsibilities, when she undertakes the charge of a patient suffering from an infectious fever. She must think of her patient, the public, and herself.

While doing her utmost to help the patient safely through his illness, she must never forget that the slightest carelessness on her part may result in others catching the disease. At the same time, it is clearly her duty to guard herself by all reasonable precautions against infection. She should keep her finger-nails short, never omit to use the nail-brush before a meal, and get all the fresh air she can. Not that she ought ever to put herself first, and be careful to the verge of fearfulness on her own behalf—that is a fault that can very seldom be laid to the charge of nurses; much more often one has to blame them for not taking

enough care of themselves, which is in itself a serious fault. Moreover, those who are careless about themselves are apt to be the same about other people, and hence are more likely to carry contagion away with them from the sick-room.

Contagion.—The contagion of a disease is something which, leaving the patient's body in the breath, excretions, or in flakes of dead skin, is able to start the disease in another individual. We know what the contagion or source of infection is in some of the specific fevers—for example, diphtheria is known to be caused by a very minute rod-shaped germ. On the other hand, as yet we do not know the nature of the contagion in scarlet fever, smallpox, &c., the germs of those diseases so far not having been discovered.

It is not always possible to say when an individual contracted one of these specific fevers; because for some time after the contagion enters the system it gives no sign of its presence, the affected person's health continuing as good as it was before he became infected. This period, which varies in length in different diseases, is called the stage of *incubation*. During it the germs are busy multiplying in the system, and producing their poison. After a time, when sufficient of the latter has been made, the patient falls ill, and symptoms of the disease for the first time manifest themselves. This is called the period of *invasion*, since it is the beginning of the illness. In some diseases at a later period a rash appears, giving rise to a third stage, the stage of *eruption*. All the symptoms of the disease—fever, wasting, rash, and delirium —are due to the "toxine" or poison which is being

manufactured by the germs, and carried all over the system in the circulation.

The various fevers differ widely among themselves as regards the period of illness when they are most infectious, the ease with which the contagious element is destroyed, the channel by which that contagion enters, and also that by which it leaves the system.

Disinfection.—Nurses should understand clearly the difference between disinfectants and deodorants.

A disinfectant is something that "frees from infection"—*i.e.*, if used in sufficient strength it kills the contagious element. A deodorant, on the other hand, merely "frees from smell"—*i.e.*, it hides the odour, but does not necessarily destroy the cause of it, though some deodorants are also disinfectants. Carbolic acid is a disinfectant, eau-de-Cologne a deodorant. The risk attached to the use of deodorants is that some people are quite satisfied when they have hidden a smell, instead of finding out and removing the source of it. A bad smell is Nature's danger-signal, to hide which is equivalent to the removal of the notice-board which tells you where the ice on a frozen pond is dangerous.

No amount of sweet-smelling odours, or spraying with carbolic lotion, could render the air of a room healthy if a bed-pan with a stool in it were allowed to remain under the bed. On the other hand, there is no objection to the use of eau-de-Cologne in moderation when the bed-pan has been removed, provided that it is never used as a substitute for ventilation.

Disinfectants.—The only absolutely reliable disinfectant is heat in the shape of boiling water, steam, or hot air of a temperature of 250° Fahrenheit. Articles

that have been disinfected by heat are said to have been sterilised—*i.e.*, they are by it rendered absolutely free from every sort of germ. For things that cannot very well be subjected to the action of heat we have to use chemical disinfectants, called "germicides," or germ-killers. These are very much less satisfactory than heat.

Of chemical disinfectants the best are carbolic acid, 1 in 20, and perchloride of mercury, 1 in 1000. If used in weaker solutions than these, they cannot be relied upon to kill germs. Another very efficient, but more expensive, disinfectant is formalin, 1 in 100. Milk of lime and chloride of lime are very useful for disinfecting stools.

Disinfection of Patient and his Surroundings.—We must now consider in detail the best method of disinfecting the patient and his surroundings—*i.e.*, of preventing the spread of infection. Some of the precautions named refer more particularly to private nursing.

(*a*) *Air of Room.*—Constant and free ventilation is absolutely the only method of purifying the air of the apartment in which the patient is lying. This is most important, as all manner of noxious emanations are given off by the patient's body, which are hurtful both to himself and his attendants. The risk of the latter catching the disease is much diminished by free ventilation. The window, unless the weather is very cold, or the patient suffering from bronchitis, should be kept constantly open from the top, a screen, if necessary, being arranged to keep the draught off the bed. In mild weather the window should be opened top and bottom twice a-day, and the room thoroughly flushed

with fresh air, the patient meanwhile being carefully covered up.

A small fire is an aid to ventilation, as has already been explained.

Attempting to disinfect the air of the sick-room by means of carbolic sprays, or by standing dishes of the same lotion about the apartment, is absolutely useless. They act to a certain extent as deodorants, but nothing more. A sheet kept constantly wet with 1 in 100 carbolic lotion is usually hung over the door of the patient's room in private houses. As long as it is wet it is undoubtedly useful, since dust and germs, which would tend to blow from the sick-room into the house when the door is opened, will strike against the moist surface and be retained by it. Moreover, the presence of the sheet gives a feeling of security to the rest of the household, which is of some importance when it contains any nervous individuals.

(*b*) *Linen of Patient.*—Both the body and bed linen after use should be at once placed in a disinfectant solution. The strength of this will depend upon the purpose for which it is used. If it consists of carbolic acid, and is intended to disinfect the linen (*i.e.*, to kill the germs in it), nothing weaker than 1 in 20 will be of any use. This is very trying for the hands. If, however, the solution is intended to check the growth and prevent the spreading of germs, 1 in 40 is quite strong enough. Better than this would be a solution of izal or lysol (1 in 100), as these preparations do not roughen the skin of the hands in the same way that carbolic acid does. Perchloride of mercury stains linen, and formalin is expensive, besides being very irritating to the eyes and lungs.

A hip or foot bath would be a convenient receptacle, as a large quantity of the disinfectant is needed when articles like sheets have to be soaked in it. The bath should stand in an adjacent apartment. Immersing them in a disinfectant solution renders them for the time quite unable to give off any infectious matter, contrary to what would be the case were they dry. No dust can escape from them, and, therefore, unless they are handled, no germs.

As regards the final cleansing of these articles, they should, if possible, be washed at home, or, if that is not practicable, they should be placed in boiling water for ten minutes before being sent out of the house. This can usually be managed by means of a large stock-pot. If there is a steam disinfecting station near, the patient's linen should pass through that before going to the public laundry.

If there is no convenience at home for washing or boiling the linen, and no disinfecting station to send it to, it should be allowed to soak for at least twelve hours in the disinfecting solution before going to the laundry. It should then be tied up in a clean sheet, having been kept in the disinfectant till the time comes for it to be fetched. This ensures its being wet when it leaves the house, so that no dust can escape from it when handled.

Especial care is needed in the treatment of soiled linen from cases of enteric fever. If very dirty, it should first be rinsed in plain water, being well pressed and stirred about with a stout stick, to remove as much of the excretal matter as possible before placing it in the bath with the other articles.

(*c*) *Excreta.*—For disinfecting the stools in enteric

freshly prepared milk of lime, 1 in 20 carbolic acid, or 1 in 1000 perchloride of mercury, may be used. Before it is given to the patient a small quantity should be put in the bed-pan, the handle of which should have been previously firmly plugged with a rubber cork or carbolised tow. After use, it is covered up and at once removed from the room, and enough disinfectant added to completely cover the stool. The best method for finally disposing of an enteric stool would be to mix it with sawdust and burn it, or with lime and bury it. As a rule, neither is practicable, and it has to be emptied down the w.c. Before doing this, it should be allowed to stand for an hour, to give the germicide a chance of acting upon the microbes of the disease, which abound in the stools and urine of enteric patients. At the best this is a very imperfect method of disinfection. While the stool is standing, the bed-pan should be covered with a cloth moistened with 1 in 20 carbolic, which should be thickly sprinkled with carbolic or sanitas powder. This will absorb any noisome emanations. This should also be done when a stool is being kept for the medical attendant's inspection.

The urine should be mixed with an equal bulk of a similar solution, and also allowed to stand for an hour before being emptied away.

(*d*) *Sputum.*—Some 1 in 20 carbolic, or 1 in 1000 perchloride, should be placed in the cup before use, more with a view to preventing the sputum adhering to the sides and bottom of the vessel than with the idea of disinfection, since germicidal solutions are quite unable to penetrate a thick glairy sputum, and kill the germs which are buried in it.

All discharges from the patient's nose and mouth should be wiped away with wool or pieces of soft rag, which should be placed in a porringer and subsequently burnt. Handkerchiefs should never be used in diseases like scarlet fever, measles, and diphtheria, where the great source of infection lies in these discharges.

(*e*) *Patient's Body.*—In scarlet fever the flakes of skin which separate from the body during the process of desquamation are infectious. Many physicians, therefore, during the peeling stage, have their scarlet fever patients anointed daily from head to foot with a germicide, usually carbolic acid dissolved in olive-oil. This also is of advantage in preventing the escape of dust and particles of skin from the patient. In addition, warm baths are frequently given during convalescence.

When discharged, the patient should have a final bath in a different room to those in which he has been living, washing himself thoroughly from head to foot with soap and hot water. After drying himself, he should proceed, wrapped in a clean blanket, to a fresh apartment, where he will find clean clothes waiting for him.

After death the body is still infectious. It should be washed all over with soap and water, and as soon as possible screwed down in the coffin.

(*f*) *Patient's Room.*—After a patient has finally left his apartment, it, and all it contains, should be disinfected as thoroughly as possible before it is allowed to be used again. Exactly the same precautions should be taken with the rooms of those who have been in attendance on him.

Everything that can be spared should be burnt,

since that absolutely destroys all risk. This should invariably be done in the case of the patient's brush and comb, nail-brush, tooth-brush, and sponge, and the broom which has been used to sweep the floor. All the bedding, and any carpets or blinds there may be in the room, should be sent to a disinfecting station to be treated with steam. If that is not possible, they must be disinfected at home with formalin, and afterwards exposed for some days to the action of sunlight and fresh air, both of which help to destroy the vitality of germs. All small articles—such as knives, spoons, and forks—should be boiled, and all crockery-ware thoroughly cleansed with boiling water, and immersed for some hours in 1 in 20 carbolic acid.

As a preliminary to the final cleansing, the room and its furniture is usually subjected to fumigation by means of the vapour of burning sulphur. This is a very unreliable method, and consequently objectionable, owing to the blind faith many people have in it, which leads them to trust to it alone, and neglect other and much more essential precautions. Every orifice by which air can enter or escape from the room—such as doors, windows, chimneys, and ventilators—is first closed up by the help of paste and paper. The room should then be filled with steam by boiling a kettle over a spirit-lamp, as the sulphur fumes act better on a damp surface. The fire-irons should be removed, otherwise they will be discoloured by the sulphur.

A small room 11 feet square and 12 feet high would require about 5 lb. of sulphur, one twice that size 10 lb., and so on. The sulphur is placed in

common earthenware dishes, which stand in larger ones containing water. A little methylated spirit is poured over the sulphur to make certain of its catching light. The door leading into the chamber is afterwards pasted up on the outside, and the room left for twenty-four hours.

In the place of sulphur formalin may be used. It is much more efficacious and also much more expensive. A special apparatus with directions for use is sold, by which tabloids containing formalin are vaporised by means of a lamp.

A simpler method is to hang one or more sheets in the room, and by means of a watering-pot with a fine rose, saturate them with formalin. At the same time, articles, such as mattresses, which it has not been possible to disinfect with steam, should be freely sprinkled on both sides and hung over the backs of two chairs. All this will have to be done very quickly, as the vapour of formalin is most irritating.

At the expiration of twenty-four hours doors and windows are thrown open. All the furniture in the room, doors, floors, window-sills, &c., are to be thoroughly scrubbed, the paper stripped off the walls, the ceiling whitewashed, and the woodwork repainted. If possible, the room should then be left for a week, with the doors and windows wide open, so that it may be thoroughly aired.

CHAPTER XVI.

ON THE PRODUCTION OF SURGICAL CLEANLINESS.

THE success of the surgical nurse of the present day depends entirely on her ability to understand and appreciate the theory of "asepsis," or surgical cleanliness, which underlies the practice of modern surgery, and her capacity for intelligent attention to the minutest details. By absolute, or surgical, cleanliness is meant, not merely a freedom from dirt, such as would be obvious to the naked eye, but also a freedom from germs. To properly understand the importance of this, it is necessary first to say a few words about germs.

Germs, or microbes, as they are called, are extremely minute forms of vegetable life belonging to the order of Fungi. So small are they that, when magnified by the microscope many hundreds of times, they only appear as small dots or very minute rods (fig. 8).

Fig. 8.—*Germs.*

They are present everywhere—in earth, air, and water. Each one of us carries countless thousands on the

skin, as well as in the nose, throat, stomach, and intestines. They are, therefore, naturally more numerous where many human beings are congregated together—*e.g.*, there are more of them in towns than in the country.

Very many germs are quite harmless; others set up certain diseases such as diphtheria and typhoid fever; while a third class, when introduced into wounds, cause them to become inflamed and suppurate.

Germs multiply with the most extraordinary rapidity. A single microbe is able to give rise to many thousands of its kind in the course of a few hours. To do this it must be living under favourable conditions; it must be supplied with both heat and moisture. The germs which are contained in a dry piece of diphtherial membrane, though alive, are not growing, because they lack both warmth and moisture. If, however, that dried membrane is placed in a flask of broth which is kept at the temperature of the human body, those germs will quickly increase in number, because now they have both warmth and food. The temperature of the human body is favourable to the existence of most germs. These organisms gain admittance in the food, or by way of the nose and lungs, or by wounds.

When germs, which are poisonous to human beings, have established themselves within the body, they irritate the part in which they are located, and set up inflammation—*e.g.*, the germ of pneumonia causes inflammation of the lungs, that of diphtheria inflammation of the throat, while various others set up inflammation and suppuration in wounds. At the same time, while growing in these various situations,

they produce certain poisons or toxines, which are absorbed into the circulation, and set up fever and various other symptoms.

The Progress of Surgery. — Fifty years ago surgeons knew practically nothing of the influence of germs upon the healing of wounds. Suppuration after operation was then the rule rather than the exception, the death-rate in consequence being enormously high; indeed, many surgeons refused to undertake operations which are now performed with impunity.

Then came M. Pasteur with his wonderful researches into the processes of fermentation and putrefaction, both of which he proved conclusively to be the work of germs. From the knowledge so gained Lemaire argued that suppuration occurring in a wound was due to the same cause, and instead of being essential to the process of healing, as had hitherto been taught, was inimical to that process, and should, if possible, be stopped. This, he showed, might be done by means of antiseptics, which would either kill the germs or at least prevent them growing.

To Lord Lister belongs the credit of grasping the enormous importance of Pasteur's and Lemaire's discoveries upon the practice of surgery. He went a step further, and devised a method whereby living germs or bacteria, as they are called, might be prevented entering an operation wound, and causing it to become septic.

Antiseptic Surgery.—His method was called the "antiseptic" method, and consisted in the constant use of antiseptics, or, as they are more properly called, germicides, so that all germs in the neighbourhood of the wound might be killed. With this end in view

a spray of carbolic acid and water played on the wound during the time it was exposed to the air. It was flushed with a strong germicidal solution before the stitches were put in, and dressings impregnated with some antiseptic were afterwards applied. The sponges, instruments, and hands of those who assisted at the operation were treated with similar solutions.

These precautions were essentially "antiseptic"—that is to say, they were undertaken with a view to killing any septic germ which might happen to gain entrance to the wound, the original idea being that microbes, being everywhere present, must gain access to the wound, and consequently such solutions must be used as would kill them or hinder their development.

Aseptic Surgery.—At the present day our object is still to keep the wound free from germs; but it is now recognised that the principal danger lies in its direct contamination during the operation. Our efforts are therefore now directed towards ensuring a complete freedom from living germs of everything which may be used during an operation. By doing this, we, as far as possible, prevent germs entering the wound, which is better than allowing them to get in, and then endeavouring to kill them with antiseptics. At the same time, we have by no means given up the use of these drugs. They are most useful, and in many cases indispensable to the production of a state of surgical cleanliness.

Antiseptics.—There are a great variety of drugs which, when used in a sufficiently concentrated form, possess the power of killing germs, while in weaker solutions they are able to prevent their growth. Two of the most reliable, but which at the same time have

the drawback of being two of the most poisonous, are carbolic acid and perchloride of mercury.

Carbolic Acid, which is obtained from coal-tar, is a crystalline substance soluble in alcohol, ether, or glycerine. For lotions it is usually dissolved in glycerine, to which is added distilled water sufficient to bring it to a strength of 1 in 20. When intended to act as a germicide, it must not be used in a weaker solution. This strength is useful for disinfecting excreta, but is too strong for application to wounds. For such it should be diluted to 1 in 40 or 1 in 60; though occasionally the pure acid is rubbed into very foul and sloughing wounds, since these do not possess the same power of absorption that a clean raw surface does. The first symptom of carbolic-acid poisoning is a dark olive-green appearance of the urine, which is readily produced by the application of carbolic compresses to the skin of young children. The drug should be at once discontinued. Carbolic gauze, which is of a deep yellow colour and rather harsh texture, contains 5 per cent of the acid, and forms a very useful antiseptic dressing. A solution of carbolic acid, as strong as 1 in 20, blunts knives, if they are left in it for any length of time, but otherwise has no injurious effect upon metal instruments.

Perchloride of Mercury acts as a germicide when used as strong as 1 in 1000, though less efficient than 1 in 20 carbolic acid. For washing out cavities, where there would be a risk of absorption, 1 in 8000 is strong enough. Sal alembroth gauze and wool, which are dyed a bright blue colour, are said to contain 1 and 2 per cent of the drug respectively, combined with chloride of ammonium. Perchloride of mercury is

intensely poisonous, producing vomiting and diarrhœa, and, if enough has been absorbed, collapse and death. Metal instruments should never be placed in a solution of it, otherwise they become black, owing to the mercury being deposited on them.

Biniodide of Mercury is used in the same way, and of the same strength as the perchloride. It is difficult to obtain pure, and is very expensive. It is much less irritating to the skin, and a 1 in 500 solution in spirit is frequently used for disinfecting the hands before an operation. It does not, like the perchloride, coagulate blood, and sponges are therefore easily and quickly cleansed in it during an operation. It is only used as a lotion; there is no corresponding gauze or wool.

Cyanide of Mercury and Zinc is, like the perchloride and biniodide, intensely poisonous. It is only used to impregnate gauze and wool, which contain 3 per cent of the drug, and are dyed a pale lavender colour. It is less irritating to the skin than the perchloride.

Boracic Acid is a very feeble antiseptic, but possesses the advantage of being practically non-poisonous, so that it can be used for washing out large wounds and cavities where a more powerful germicide would be inadmissible.

Iodoform is a yellow powder, with a characteristic and very powerful odour. It is dusted over wounds, when the operation is completed, and the dressings about to be applied. It is frequently diluted with 2 or 3 parts of powdered boracic acid, as a larger quantity can then be used—*e.g.*, in filling small cavities—with much less risk of poisoning the patient.

In addition to the above there are *Izal* and *Lysol*, which, like carbolic acid, are prepared from coal-tar,

and have the advantage of being non-poisonous; *Iodol*, which is an inodorous powder possessing the same qualities as iodoform; *Thymol*, *Salicylic Acid*, *Eucalyptus Oil*, *Permanganate of Potash*, and many others.

The production of Asepsis. — By "asepsis" is meant the absence of septic germs—*i.e.*, a condition of surgical cleanliness. It is of the utmost importance that a nurse should understand, and know how to render aseptic, everything which is concerned in the treatment of an operation wound. Owing to the universal prevalence of germs, it is by no means an easy matter to protect the patient from them. This can only be done by the most careful, intelligent, and unremitting attention to minute details of cleanliness, assisted by the judicious use of antiseptics. The non-success of many an operation has been due to some slight carelessness on the part of a nurse who has failed to recognise the importance of little things. Want of attention at any point may admit of the entrance of germs, and consequent suppuration of the wound. The great truth that a nurse must always keep before her is, that for the production of asepsis cleanliness is all important, and that antiseptics play but a very secondary part. She must never delude herself with the idea that a dip into 1 in 20 carbolic acid will make up for want of thoroughness in cleaning. Such a delusion, which even now is only too common, is fraught with danger to the patient.

Everything likely to come within the field of an operation will now be enumerated, and the best way to render each as nearly as possible aseptic pointed out.

1. *The Operating Theatre.*—The theatre, or, if in

a private house, the room where an operation is going to be performed, should be—

(*a*) Clean and free from dust. Where there is dust there are germs. The less dust there is moving about in the air at the time of operation, the fewer germs there will be to settle with it on the wound. No dusting or brushing should therefore be done in a room for at least four hours before the operation is performed, so that the germs in it may have plenty of time to settle again on the walls and floor. Such dusting, as is necessary, should be done with a damp cloth. Modern theatres are built with glazed walls and mosaic flooring, and are therefore easily kept clean by flushing with a hose. In a private house the curtains and carpet should be removed, and the room scrubbed and dusted the day before the operation.

(*b*) Of a proper temperature. It is very essential that the room should be warm enough, otherwise the patient will be more likely to suffer from shock after the operation. The nurse should therefore be thoroughly acquainted with the method of warming the theatre, and be able to regulate it accurately. A good average temperature is 70°, which in severe abdominal operations might with advantage be raised to 80°, but the surgeon's wishes in this respect should always be consulted, as some operators prefer a higher temperature than others.

The nurse in charge of the theatre should always be sure that the water supply is in good order, and that plenty of both hot and cold is obtainable.

2. *Tables.*—Modern operating-tables are made of brass, or enamelled iron, frames with plate-glass tops.

An iron frame is preferable to one of brass, since the former is easily cleaned with soap and water, while the latter requires a lot of polishing. The table upon which the operation is going to be performed is usually kept warm by hot water or some other means. It should be thoroughly cleaned before an operation, and at once covered with a sterilised sheet. There are, in addition, other smaller tables for the instruments, dressings, and bowls of lotion, and one for the anæsthetist's use.

In a private house the wooden table, which is probably the only one obtainable, should be scrubbed with soap and hot water some hours before the time of operation, and at once covered with a clean sheet.

The instruments should be laid on a clean towel which has been wrung out of 1 in 20 carbolic lotion.

3. *Sponges* are by no means easy to sterilise—*i.e.*, to render absolutely free from germs—since they are at once spoiled by boiling. To see whether a sponge is sterile, a small piece is snipped off with surgically clean scissors and dropped into specially prepared broth, which is then placed in an incubator. If the sponge contains germs, they will quickly grow in the broth, and be at once recognised when a drop of it is examined next day under the microscope. In the same way we can tell whether we have been successful in rendering our hands, or the patient's skin, absolutely clean.

The following is, according to Mr Lockwood, the best method of cleaning sponges:—

New sea-sponges should first be well beaten and shaken, and afterwards a good stream of water allowed to run through them, to get rid of as

much sand as possible. They are then squeezed dry, and transferred to a solution of hydrochloric acid (℥ii. to Oi. of water), where they are left for twenty-four hours. This dissolves out any pieces of shell or coral they may contain. They are next washed in sterilised water (*i.e.*, water which has been boiled for fifteen minutes and then cooled), and afterwards placed in a hot solution of washing soda (℥i. to Oi. of water). They are next thoroughly rinsed in hot sterilised water, and then placed for twelve hours in a cold solution of sulphurous acid and sterilised water (1 in 3). This bleaches them and completes the cleansing process. It is important that the sponges should be completely covered with this solution, as any part of them which is exposed to the air becomes discoloured. Finally, the sulphurous acid is washed out of them with sterilised water, and they are then placed in a glass jar containing a 1 in 20 solution of carbolic acid, where they remain till wanted. This solution must be changed once a-week.

Before an operation, the sponges are removed from the jar with a pair of sterilised forceps, and placed in basins containing the antiseptic solution which the surgeon is going to use. They should be handed in the basins, the operator or his assistant squeezing them out as they require them. They are then more likely to be aseptic than if they are wrung out by the nurse, since the less they are handled the better. During the operation the sponges should be washed by some one with aseptic hands in lukewarm sterilised water, so that the blood may not coagulate in them as it would if hot water were used, and again handed to the surgeon in a basin of antiseptic solution.

One nurse should attend to the sponges and dressings alone, and, having previously thoroughly cleansed her hands, should touch nothing during the operation which is not sterile. Any sponges that have been used for a foul wound, or that may have come in contact with pus, should be destroyed. Any that might fall on the floor would be placed on one side, and not used again during the operation. Some operators, not feeling satisfied that sea-sponges, after being once used, can be rendered surgically clean, prefer to use pads of gauze, or balls of absorbent wool wrapped in gauze and sterilised.

After an operation, the sponges should be thoroughly washed at once in the cold soda solution, to get rid of all fat and blood, before placing them in sulphurous acid and sterilised water.

4. *Instruments.*—All instruments can be rendered absolutely sterile by means of boiling water. A clean sauce-pan will do perfectly well, though a metal steriliser containing a wire basket in which the instruments are placed is more convenient. The water should first be brought to the boiling-point, then, a teaspoonful of washing soda being added to each pint of it, the instruments are immersed, and the water kept on the boil for another five minutes. The instruments are now sterile, and should be removed with a pair of sterilised forceps from the soda solution or the wire basket, and placed in a sterile dish containing 1 in 60 carbolic lotion.

The object of boiling the water before placing the instruments in it is to expel any air that it may contain, as there is then less likelihood of their becoming rusty. This is further prevented by the addition of

the soda. Knives should have their blades wrapped in white wool or lint to protect the edges. With the instruments will be boiled any rubber or glass drainage tubes that are going to be used.

5. *Dressings.*—These are sterilised by means of steam in a special apparatus. This, when ordered by the surgeon, should be done after the dressings have been cut. They should be placed in the steriliser folded up in a towel, which should not be opened until they are just about to be applied. If the surgeon thinks they are sufficiently sterile in the packets in which they are supplied, great care should be taken that no dust gets to them in their preparation.

The nurse should undo the packet, and then wash her hands before touching the contents, which should be laid on a clean towel and cut with sterilised scissors. Directly the dressings are cut, they should be wrapped in a sterilised towel and kept in an air-tight box till wanted. With the dressings can be sterilised such towels as are going to be used in the field of operation.

Silk which is going to be used for either sutures or ligatures is usually sterilised by boiling.

6. *The Patient's Skin.*—The great difficulty in sterilising the skin is to get rid of the greasy secretion with which it is covered, since the germs which are on it, being coated by this grease, are thereby protected against the action of the various disinfectants, which are quite unable to penetrate it. That is the reason why merely dipping the hands into a solution of carbolic acid or perchloride of mercury is so absolutely inefficient as regards the production of surgical cleanliness.

To begin with, the part should be shaved, and then thoroughly scrubbed with soap and hot water to which has been added a little washing-soda. The nail-brush, when not in use, should be kept in a solution of perchloride of mercury. Afterwards it is well rubbed with turpentine or ether to remove all grease. A dressing soaked in weak carbolic (1 in 50) or perchloride lotion (1 in 2000) is then applied, and left on till the time of operation. For children the lotion used would only be half the above strength. This preparation of the part should be done at least twelve hours before the time of operation.

7. *The Hands.*—The hands of the operator and all his assistants must be rendered as nearly absolutely clean as possible. For this purpose the nails should be cut quite close, and the hands given a thorough scrubbing with soap and hot water and an aseptic nail-brush, after which they should be soaked for a couple of minutes in an approved antiseptic. When a nurse has cleaned her hands in this way, she should be very careful to touch nothing that is not sterile until the operation is completed.

We are able to tell if the skin is aseptic by employing the same method that is used for sponges or dressings. A small piece of skin is snipped off with sterilised scissors and dropped into a tube of broth, where any germs that may be present will quickly grow and multiply.

All surgeons and their assistants wear clean linen blouses, so that no portion of their ordinary clothes can come in contact with anything in the field of operation.

The air of an operating-room we cannot sterilise. To minimise as far as possible the number of germs in it, all dust should be avoided; while irrigation with weak antiseptic lotions is used to render harmless any microbes that may stray from the atmosphere into the wound.

CHAPTER XVII.

SURGICAL NURSING.

In this chapter it is proposed briefly to consider surgical nursing from a general point of view. Individual operations, together with the special treatment of certain wounds and injuries, will form part of the next volume.

Wounds.—Open wounds may be:—

(*a*) *Incised—i.e.*, made with a sharp cutting instrument, and therefore presenting clean-cut edges.

(*b*) *Lacerated*, in which case the edges are ragged.

(*c*) *Contused*, where there is bruising of the edges.

(*d*) *Punctured*, in which the external opening is small as compared with the depth of the wound.

Incised wounds are liable to bleed freely, but, other things being equal, heal rapidly. Lacerated and contused wounds, on the other hand, bleed less and heal more slowly. Punctured wounds, owing to the small external opening, are difficult to drain, and hence liable to become inflamed.

Healing of Wounds.—This takes place in one of two ways:—

1. *Without Inflammation—i.e.*, without more than

the temporary inflammation caused by the infliction of the wound. The edges straightway become glued together, and remain so. There is at no time any discharge beyond a small quantity of blood-stained serum in the first few hours. At the end of ten days or a fortnight the wound has completely healed, a thin red scar being all that remains of it. This is called "primary union," or "union by first intention." This is the way in which incised wounds usually heal, and such punctured wounds as have been made by a clean cutting instrument, and contain no foreign matter in their depths.

2. *With Inflammation.*—Some source of irritation is present in the wound, which prevents the sides of it becoming glued together and healing by primary union. As a result of this, the inflammation, which in a clean-cut wound does no more than glue the edges together, persists, and leads to the formation of pus.

This irritation may be due to the nature of the injury—*e.g.*, if the edges of the wound are bruised or lacerated, they must die and be separated from the adjacent healthy tissues before healing can take place. Or it may be caused by the presence of a foreign body or some poison in the wound, want of proper drainage, or lack of vitality in the patient. Owing to one of these causes, persistent inflammation is set up in the wound, leading to the formation of pus, and consequent slow process of healing by "granulation"—"union by second intention," as it is called.

In such a case, about the third or fourth day after the injury small red elevations are seen at the bottom of the wound. These are called "granulations" or "granulation tissue." Day by day this tissue grows

upwards from the bottom of the wound. It is so delicate and easily irritated that even the dressings which rest on it cause the cells which line its surface to perish and separate from it.

When the granulation tissue has filled the wound, and risen on each side to the level of the skin, the latter begins to grow over it, until at last the whole of the wound is covered with skin, and healing is complete.

The scar formed when healing takes place by this method is very different from that which follows "primary union." In that case, owing to the sides of the wound at once growing together, practically no new tissue is formed, so that scarring is reduced to a minimum. When much granulation tissue is formed, a well-marked scar is the necessary result, since all the new tissue eventually develops into fibrous or scar tissue. This, as it forms, very slowly contracts, so that if the original injury, such as a deep burn, caused much loss of tissue, the ultimate deformity from contraction of the scar may be very great.

Treatment of Wounds.—Speaking generally, the following precautions are necessary to ensure the healing of a wound:—

The wound itself must be absolutely clean, and free from all foreign matter which might irritate it and set up inflammation. If necessary, it must be well drained, so that there may be no accumulation of discharges in it. That part of the body which has been wounded must be kept at perfect rest. This is most essential. The general health of the patient must be maintained, and his surroundings rendered as hygienically sound as possible.

In wounds that are healing by "second intention" the granulation tissue sometimes grows so exuberantly that it projects above the level of the skin, which is in consequence unable to grow over it and complete the process of healing. To remedy this, the surface of the granulation tissue is destroyed by the application of an astringent, such as nitrate of silver, so that it is reduced to the level of the skin, which is now able to spread over it. In other cases the granulation tissue is pale, flabby, and unhealthy looking. For this a stimulating lotion or ointment is applied, causing it to grow with increased vigour.

Skin-grafting.—This form of treatment is employed when a large area of granulation tissue has to be covered with skin, as after extensive burns. By means of a very sharp knife, which should only go just deep enough to draw blood, pieces of skin are pared off the arm or leg of the patient, and, with as little handling as possible, laid on the granulating surface. The "grafts" are then covered with a piece of oiled silk to prevent them adhering to the dressings, which, as a rule, are left undisturbed for about four days. Those grafts which adhere, and finally grow on to the granulating surface, become centres from which skin spreads outwards over the sore to meet that which is growing inwards from the edges. The time taken in healing is thus materially shortened.

Shock.—Shock is a condition of intense depression of the nervous system, due either to injury or fright. Gunshot wounds, burns, and injuries received in railway accidents are especially liable to produce shock, the two last-named more especially, from the state of terror which is induced by them. Severe opera-

tions, such as those on the abdominal viscera or amputation through the thigh, are liable to be followed by shock. A nervous, excitable patient will suffer more from shock than one who is calm and phlegmatic. The same may be said of one who has great mental worries, bad health, or who has been poorly and improperly fed. The severity of this condition after operation has been much lessened since the introduction of anæsthetics, and since more care has been taken in keeping up the warmth of the body during operation.

Symptoms.—The patient lies in a condition of prostration or collapse. The pulse is rapid and small, the temperature sub-normal, respiration sighing, expression anxious, while the skin of the face and trunk is pallid and perhaps covered with a cold sweat. There may be nausea and vomiting, and in severe cases relaxation of the sphincters, leading to incontinence of urine and fæces. If the patient fails to rally from this condition, death ensues.

Treatment.—To remove the depression of the nervous system, and resuscitate the patient's vital powers, we use warmth externally and stimulants internally. Pillows should be taken away, and the foot of the bed raised. Hot blankets are then wrapped round the patient, and hot bottles placed near him, care being taken that the latter are properly protected by flannel, since shock is accompanied by a lessened sensibility to pain, so that a burn might easily be produced without the patient knowing it. A fomentation applied to the region of the heart, or to the perinæum, is a very useful method of stimulation. While external warmth is being applied, stimulants should be ad-

ministered internally. Hot beef-tea, coffee, and tea are all useful, if the patient is able to take them. They should be drunk slowly, in small quantities at a time. Should vomiting be troublesome, rectal injections will have to be used. Hypodermic injections of strychnia, ether, or brandy are most useful, and in many cases indispensable, in the treatment of severe shock. Morphia or opium is used if much pain is present as well as shock, so that it seems probable that the latter may to a certain extent depend upon and be due to the former. Warm saline solutions are sometimes injected into a vein with the happiest result.

In the treatment of shock care must be taken that the stimulation does not go too far, or an injurious reaction may be produced. All that is wanted is to restore the exhausted nervous system to its normal condition. As soon as the pulse begins to improve, and the patient to show signs of returning strength, the stimulants should be gradually discontinued.

The Preparation of a Patient for Operation.—If possible, a warm bath should be given the evening before. That part of the skin which is to form the field of operation is then prepared in the manner which has been already described (p. 232). A purgative is afterwards administered. This may be any medicine the patient has been accustomed to take, if it is known to be effective. It should be followed in the early morning by a soap-and-water enema, and this, if it brings away much fæcal material, by one of plain warm water. If the operation is abdominal, particularly if it is in any way connected with the bowel, the nurse ought to obtain detailed directions as to

this part of the preparation, since the usual procedure might do harm. While preparing a patient for operation, the nurse should do what she can to keep his spirits from failing, by taking a cheerful view of the case, and speaking of the good that will result from the operation.

As a rule, no solid food is allowed to be taken during the six hours immediately preceding the time of operation; otherwise the patient will probably vomit while under the anæsthetic, in which case there is a risk of food getting into his air-passages. There is no objection, however, to a cup of hot beef-tea, or some stimulant and water, being given a couple of hours before the surgeon's arrival. These are both very quickly absorbed, and hence stay but a short time in the stomach. In the case of patients who are very weak, and in constant need of nourishment, it is as well to ask for instructions in this matter.

Before going to the theatre the hair should be brushed, and in females plaited on either side and arranged without hair-pins, so as to be out of the way of the operator and his assistants. False teeth should be removed, and the patient attired in a clean night-dress, stockings, and warm flannel operation-gown. Just before the operation the patient should pass water; in abdominal cases the catheter should be used, to make certain that the bladder is empty; while if the operation is likely to involve that organ, the nurse should ask for directions.

The Operation-Bed.—This is made in the ordinary way, except for very special cases. It is as well, in case of accident, to place a macintosh beneath the under sheet, which, together with the draw-sheet,

must be tucked in tightly to prevent rucking. If there are any symptoms of shock or collapse after the operation, a blanket should be placed between the patient and the upper sheet. The bed should be thoroughly warmed by means of three hot-water tins encased in flannel bags. Care must be taken that the patient does not burn himself against the tins. This is an accident which reflects great discredit upon the nurse in charge of the case. It is one that may easily happen to a patient who is still under the influence of the anæsthetic or is suffering much pain. The upper bed-clothes should be laid loosely on the bed, so that they may be quickly thrown back the moment the patient arrives. The pillow should be low and covered with a towel, or taken away altogether, another towel being at hand to tuck round the patient's neck and protect the upper sheet. A vessel should be placed at the bedside in case of sickness. The patient should not be left by himself until he has completely recovered from the anæsthetic. If he shows signs of vomiting, his head should be turned on one side and the vessel placed near his mouth.

Feeding Patients after Operation.—As a rule, no food is administered for three or four hours after an operation, or until the nausea which follows the anæsthetic has passed off. Not too much ice should be given the patient to suck if he complains of thirst, as this is only likely to prolong the vomiting. If, however, small pieces are swallowed whole instead of being allowed to melt in the mouth, ice is really useful for the checking of nausea. Sips of hot water are preferable. A tumbler of hot water is often a most useful form of

treatment for persistent ether or chloroform sickness, since, when returned, it practically washes out the stomach. Iced compresses to the neck also help to check vomiting. This they do by acting upon the two great nerves which run from the brain to the stomach, one lying in each side of the neck. If the patient is very weak or collapsed, it may be necessary to administer food or stimulant by the rectum almost immediately after the operation. The urgent desire for drink which follows upon great loss of blood is sometimes relieved by slowly injecting into the bowel half a pint to a pint of warm water with a pinch of salt in it. The nurse should have the necessary apparatus for rectal feeding ready, as well as a syringe for the subcutaneous injection of strychnia or ether. As the effects of the anæsthetic pass off, food should at first be given in very small quantities by the mouth—half an ounce of milk at a time—the amount and frequency of administration being gradually increased. No rules can be laid down with regard to the length of time that should elapse before the patient reaches his ordinary diet, since surgeons differ widely in their practice on this point. Should the patient's temperature rise during convalescence, it is always a safe plan to place him on milk until the surgeon's wishes are known.

The Dressing of Wounds.—The first dressing after an operation is usually done by the surgeon, or in a hospital by the house surgeon. When preparing the dressings, the nurse must pay the same attention to detail that she did for the operation.

Everything that is likely to touch the wound, or be required by the surgeon, should be sterile; and the

nurse should wash her hands in the same careful manner, and touch nothing afterwards which is not sterile without taking this precaution again. The scissors which will cut the sutures, and the forceps which will remove them, should be rendered sterile by boiling.

The dressing of granulating wounds—such as burns, scalds, &c.—is often left to the nurse. Before uncovering the wound, she should see that she has everything she is likely to want for the dressing. The edges of the wound should be kept quite clean, the adjacent skin being occasionally washed with soap and water, the wound itself meantime being covered with a temporary shield of wet lint. Rubbing should always be away from the wound, the sides of which should at the same time be supported by the other hand, so that no strain may be put on them, otherwise healing will be retarded. Moist absorbent wool may be used for sponging, or odds and ends of gauze left over from dressings, and kept in a clean jar. After once touching the wound, they should not again be dipped in the lotion, but be placed in the receiver for soiled dressings. When it is necessary to sponge a wound, the sponge should be pressed firmly on the surface of the wound and not drawn across it.

Should the old dressing adhere to the wound, it should be thoroughly soaked with lotion before any attempt is made to remove it. Strapping should be first moistened, and then taken off by lifting the two ends, and at the same time pulling them sharply towards the wound. This is much less disagreeable than doing it slowly and gently. If the part has much hair on it, it should be shaved before the

strapping is applied, otherwise the process of removal is very painful. Turpentine will remove any marks left on the skin by strapping, care being taken that it does not touch the wound, and that it is afterwards washed off with soap and water. When the surface of the wound is being cleansed by means of a glass syringe, or an irrigator, the nurse should not allow the nozzle of the instrument to become soiled by the discharge. Soiled dressings should be handled as little as possible. They should not be carried round from bed to bed, but be removed from the ward as soon as fresh ones have been put on.

It is not only in the operating-theatre that a nurse must attend to small details of cleanliness; all her work should be done in the same thorough manner. She should wash her hands before attending to each patient, and when dressing wounds, making beds, or doing ward work, she should remove her cuffs and turn up her sleeves. Wounds should not be dressed in a ward where beds are being made, or where dusting and sweeping have but lately been finished.

The Importance of Rest in the Healing of Wounds.—This has already been mentioned earlier in the chapter. It can do no harm to again call the attention of nurses to the fact that if the edges of a wound or a broken bone are not allowed to remain in complete apposition (*i.e.*, if they are in the least degree separated by movement of the part), healing is prevented or much retarded. A patient should therefore not be allowed to do anything for himself, entailing movement of the injured part, until the surgeon considers healing complete. It is to ensure this most necessary rest that splints and

bandages are applied; and it is most important that a surgical nurse should clearly understand why such things are used, their action, and method of adjustment. Further, she must see that they do not shift after they have been once put on. She should also find out in what position the surgeon wishes his patient to lie, since, after amputation of the breast, some surgeons like their patients to lie on their backs, others prefer to have them on their sides. In whatever position the patient is placed, he must be made as comfortable as possible, and pillows arranged so as to lessen the aching weariness of remaining long in one position. Finally, nurses should remember that useful little saying, "Never move a patient twice when once will serve."

The Preparation of Lotions.—All nurses should understand how to prepare lotions from concentrated solutions. Many do not; while others, though working correctly, do so by rote. A few words in explanation of this part of a surgical nurse's duty may prove helpful.

If we take 1 pint of a lotion containing 1 ounce of carbolic acid in each 20 ounces of the solution, and add to it another 20 ounces of water, we get a lotion containing 1 ounce of carbolic acid in each 40 ounces of the solution, or, as we say, it is of the strength of 1 in 40 (*i.e.*, 1 part of the acid in 40 parts of the lotion), and is therefore half the strength of the 1 in 20. If we add 40 ounces of water, we make it 1 in 60, or one-third the strength of the 1 in 20.

To take a more difficult example. A nurse is given a bottle containing a 1 in 50 solution of perchloride of mercury (*i.e.*, a solution containing 1 grain of per-

chloride of mercury in each 50 drops). She is told to make a pint of 1 in 1000. Simple division tells us that 50 goes into 1000 twenty times. A solution containing a grain in every 50 drops is therefore twenty times the strength of one containing a grain in every 1000 drops. One part of the former must therefore have 19 parts of water added to it to bring it down to the required strength—*i.e.*, 1 ounce of the 1 in 50 solution added to 19 ounces of water will make a pint of 1 in 1000. Similarly 1 ounce of the 1 in 50 added to 39 ounces of water makes 1 in 2000, added to 59 ounces of water makes 1 in 3000. Some nurses have a difficulty in seeing this. They think that if one solution is twenty times stronger than another, the first ought to be diluted with 20 parts of water, instead of 19, to bring it down to the strength of the second. Let us take two solutions, one of the strength of 1 in 1 (*i.e.*, a grain in each drop), and the other 1 in 20 (*i.e.*, a grain in each 20 drops). The first is clearly twenty times stronger than the second; but to convert 1 in 1 into 1 in 20, we add 19 parts of water to the one part of water in which the grain is already dissolved. If we added 20 parts of water, our solution would be of the strength of 1 in 21 instead of 1 in 20.

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THE END.

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